MARKWEST LIBERTY MIDSTREAM & RESOURCES L.L.C.

MOBLEY GAS PLANT

45CSR13 NSR PERMIT MODIFICATION APPLICATION

Markwest
Mobley
103 - 00042
13-2878E
Jerry
ok copy has been Removed

SUBMITTED TO WVDEP DIVISION OF AIR QUALITY
February 2017

MarkWest Energy Appalachia, L.L.C.
1515 Arapahoe Street
Tower 1, Suite 1600
Denver, CO 80202-2137
(800) 730-8388
(303) 290-8700
(303) 825-0920 Fax

February 27, 2017

Mr. Fred Durham, Director
West Virginia Department of Environmental Protection
Division of Air Quality
Charleston, WV 25304

Re: MarkWest Liberty Midstream & Resources L.L.C.
Mobley Gas Plant
Application for Modification Permit (R13-2878D)

Dear Mr. Benedict:

MarkWest Liberty Midstream & Resources L.L.C. (MarkWest) is submitting the enclosed Modification application in accordance with the West Virginia Air Pollution Control Act and Title 45 Series 13 (45CSR13) for the Mobley Gas Plant in Wetzel County.

This package contains the required application forms, emission calculations and supporting documentation for the referenced project. A check in the amount of $2,000 for the Modification Permit fee is included with this application. The public notice for the proposed construction will be published in *The Wetzel Chronicle*. MarkWest will forward the Affidavit of Publication to your attention once it is received from the publisher.

If you have any questions or comments, please call me (303) 542-1212 or e-mail wade.janecek@markwest.com at your earliest convenience.

Sincerely,

Wade Janecek, P.E.
Senior Environmental Engineer

Enclosures (Original + Three Copies)

TABLE OF CONTENTS

INTRODUCTION

MarkWest Liberty Midstream & Resources L.L.C. (MarkWest) requests authorization for a Modification Permit for the Mobley Gas Plant (Permit R13-2878D), in accordance with the West Virginia Air Pollution Control Act and Title 45 Series 13 (45CSR13).

Project Description

The Mobley Gas Plant is currently used for processing natural gas and is capable of doing so at a rate of 965 mmscf/d. With this submittal MarkWest is seeking to update several representations to match their as-built condition, remove an engine from the facility, update fugitive component counts based on LDAR monitoring, and make several updates based on audit findings. A summary of the proposed changes is included below.

- Add two emergency generators;
- Update the MDHI of H-5782 to reflect it's as-built rating of 50.78 MMBtu/hr;
- Remove engine CM-1002;
- Add several methanol and closed drain tanks;
- Update plant blowdown emissions based on observed actual volumes;
- Add emissions associated with rod packing and crankcase venting to the permit;
- Update fugitive component counts based on LDAR monitoring;
- Update permit condition 6.1.3.d to reference a net heating value of 300 btu/scf or greater in accordance with 40 CFR 60.18(c)(3)(ii);
- Update permit condition 6.2.4 to reference condition 6.1.3.c rather than 6.1.4.c;
- Update permit condition 6.3.1 to reference condition 6.1.3.b rather than 6.1.4.b
- Remove permit conditions 4.1.4.a and 4.1.4.b as they do not apply to units equipped with oxidation catalysts;
- Update permit condition 3.2.1 to reference the fuel gas analysis exemption outlined in 40 CSR 10-10.3 which states "The owner or operator of a fuel burning unit(s) which

combust natural gas, wood, or distillate oil, alone or in combination,shall be exempt from the requirements of section 8.";

- Remove the references from permit condition 3.2.2 for 5.1.2.c and 5.1.3.h.vi as those conditions do not exist.
- Change description of emergency flare to process flare.

Proposed Emissions

Emission calculations for the project are presented in Attachment N. Attachment N includes a summary of the new potential to emit and emission calculations for the modified and added sources.

APPLICATION CHECKLIST

A complete application is demonstrated when all of the information required below is properly prepared, completed and attached. The items listed below are required information which must be submitted with a 45CSR13 permit application. Any submittal will be considered incomplete if the required information is not included. The applicant must submit a complete application in order to receive a 45CSR13 permit.	
☑	**Class I legal advertisement published in a newspaper certified to accept legal advertisements and original affidavit submitted for Class II administrative updates, temporary and relocation permits, and general permit registrations.**
☑	**$1,000 application fee for construction, modification, relocation or temporary permit; $300 application fee for Class II administrative update. Additional applicable fees:** • **$1,000 NSPS** • **$5,000 Major Modification** • **$2,500 NESHAP** • **$10,000 Major Construction** • **$2,500 45CSR27 Pollutant**
☑	**Original and three (3) copies of the application.**
☑	**File organization – application pages are numbered and in correct order, application is bound in some way, etc.**
☑	**Confidential Business Information is properly identified.**
☑	**General application forms signed by a responsible official.**
	Authority form – required if application is signed by someone other than a responsible official – one of the following: • **Authority of Corporation if application is not signed by the President or CEO;** • **Authority of Partnership if application is not signed by a general partner or proprietor;** • **Authority of Limited Partnership if application is not signed by general partner or proprietor; or** • **Authority of Governmental Agency if application is not signed by**

	principal elected officer or ranking elected official.
☑	**Copy of current Business Registration Certificate.**
☑	**Process description, including equipment and emission point identification numbers.**
☑	**Process flow diagram, including equipment and emission point identification numbers.**
☑	**Plot plan, including equipment and emission point identification numbers.**
☑	**Area map with directions and location marked.**
☑	**Applicable technical forms completed and submitted:** • **Emission Point Data Summary Sheets** • **Emission Unit Data sheets** • **Air Pollution Control Device Sheets** • **Equipment List Form**
☑	**Emission calculations – emission factors, references, source identification numbers, etc.**

WVDEP APPLICATION FOR NSR PERMIT

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☐ **CONSTRUCTION** ☒ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
MarkWest Liberty Midstream & Resources, L.L.C

2. Federal Employer ID No. *(FEIN):*
300528059

3. Name of facility *(if different from above):*
Mobley Gas Plant

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
1515 Arapahoe Street, Tower 1, Suite 1600

Denver, CO 80202-2137

5B. Facility's present physical address:

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**
- If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**
- If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation:

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**
- **If YES,** please explain: Applicant owns the property.
- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Natural gas processing plant

10. North American Industry Classification System **(NAICS)** code for the facility:
211112

11A. DAQ Plant ID No. (for existing facilities only):
103-00042

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-2878D

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All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B.**

From W Virginia 20S, turn onto CO Rd 7/8 (2.8 mi), continue onto CO Rd 80 (0.8 mi), turn left onto CO Rd 7/4 (0.4 mi), turn right onto CO Rd 7/4/Sheep Run (0.8 mi). Turn left onto CO Rd 7/7, arrive at destination.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
14624 North Fork Rd	Smithfield	Wetzel
12.E. UTM Northing (KM): 4378315.20	12F. UTM Easting (KM):538098.82	12G. UTM Zone: 17S

13. Briefly describe the proposed change(s) at the facility:
Updates to existing permit including corrections to heater size and naming, addition of generators, correcting fugitive component counts, addition of rod packing and crankcase emissions, emissions updates to flare, removal of CM-1002, and various administrative updates.

14A. Provide the date of anticipated installation or change: Summer/Fall 2013 – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: November/December 2013

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) .
– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**

- Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

- For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☐ Bulk Liquid Transfer Operations	☐ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☐ Storage Tanks
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ General Emission Unit, specify Process heaters

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☐ Baghouse	☐ Flare
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☐ Other Collectors, specify

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ **YES** ☒ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's ***"Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity ☐ Authority of Partnership

☐ Authority of Governmental Agency ☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____ *(Please use blue ink)* DATE: 2-27-17 *(Please use blue ink)*

35B. Printed name of signee: Leanne Meyer		35C. Title: VP of EH&S
35D. E-mail: lmeyer@markwest.com	36E. Phone: 303-925-9299	36F. FAX: 303-825-0920
36A. Printed name of contact person (if different from above): Nathan Wheldon		36B. Title: Environmental Manager
36C. E-mail: nwheldon@markwest.com	36D. Phone: 303-542-0686	36E. FAX: 303-825-0920

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

☒ **Attachment A: Business Certificate**
☐ **Attachment B: Map(s)**
☒ **Attachment C: Installation and Start Up Schedule**
☒ **Attachment D: Regulatory Discussion**
☐ **Attachment E: Plot Plan**
☐ **Attachment F: Detailed Process Flow Diagram(s)**
☒ **Attachment G: Process Description**
☐ **Attachment H: Material Safety Data Sheets (MSDS)**
☒ **Attachment I: Emission Units Table**
☒ **Attachment J: Emission Points Data Summary Sheet**
☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
☒ **Attachment L: Emissions Unit Data Sheet(s)**
☐ **Attachment M: Air Pollution Control Device Sheet(s)**
☒ **Attachment N: Supporting Emissions Calculations**
☐ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
☒ **Attachment P: Public Notice**
☐ **Attachment Q: Business Confidential Claims**
☐ **Attachment R: Authority Forms**
☐ **Attachment S: Title V Permit Revision Information**
☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

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FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ *Forward 1 copy of the application to the Title V Permitting Group and:*
- ☐ *For Title V Administrative Amendments:*
  - ☐ *NSR permit writer should notify Title V permit writer of draft permit,*
- ☐ *For Title V Minor Modifications:*
  - ☐ *Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,*
  - ☐ *NSR permit writer should notify Title V permit writer of draft permit.*
- ☐ *For Title V Significant Modifications processed in parallel with NSR Permit revision:*
  - ☐ *NSR permit writer should notify a Title V permit writer of draft permit,*
  - ☐ *Public notice should reference both 45CSR13 and Title V permits,*
  - ☐ *EPA has 45 day review period of a draft permit.*

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

ATTACHMENT C: INSTALLATION/START-UP SCHEDULE

There is no additional construction or start-up of equipment associated with this modification.

ATTACHMENT D: REGULATORY DISCUSSION

There are no updates to the regulatory requirements associated with the facility with this modification.

ATTACHMENT G: PROCESS DESCRIPTION

Mobley Gas Plants I - V are natural gas processing plants for gas wells throughout West Virginia. The natural gas enters one or more molecular sieve(s), designed to remove liquids from the gas stream through contact. Heaters are employed to regenerate the molecular sieve(s) on a regular basis. After passing through the molecular sieve(s) the gas is cooled through a cryogenic plant with mechanical refrigeration, which serves to remove propane and heavier hydrocarbons known as natural gas liquids (NGLs) in the gas stream. Dependent upon several market conditions and contractual obligations a portion or all of the recovered liquids pass through a deethanization tower, which removes ethane as a purity product from the liquid stream by adding heat and driving the ethane into a gaseous phase. The ethane is transferred off-site via pipeline to market. The remaining NGLs are transported via pipeline to another facility; therefore, there are no on-site liquids storage tanks or loading facilities. The remaining residue gas stream is ready for compression prior to entering the downstream pipeline for transmission/distribution. A flare may be used to burn vapors released from emergency and/or upset conditions at the facility.

ATTACHMENT I: EMISSION UNITS TABLE

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
CM-1001	CM-1001	Waukesha P9390 GSI Engine	2012	1,980-hp	Existing	NSCR
CM-1003	CM-1003	Waukesha P9390 GSI Engine	2012	1,980-hp	Existing	NSCR
CM-1004	CM-1004	Waukesha P9390 GSI Engine	2012	1,980-hp	Existing	NSCR
CM-1005	CM-1005	Waukesha P9390 GSI Engine	2012	1,980-hp	Existing	NSCR
CM-1006	CM-1006	Waukesha P9390 GSI Engine	2012	1,980-hp	Existing	NSCR
C-102	C-102	Caterpillar G3616 LE Engine	2012	4,735-hp	Existing	Oxid. Cat.
C-103	C-103	Caterpillar G3616 LE Engine	2012	4,735-hp	Existing	Oxid. Cat.
G-1	G-1	Generac MMG45 Generator	2012	53 hp	New	None
G-2	G-2	Kohler 40ERES Generator	2012	75 hp	New	None
H-741	H-741	Regeneration Gas Heater	2012	6.84 mmBtu/hr	Existing	None
H-781	H-781	Heat Medium Oil Heater	2012	18.05 mmBtu/hr	Existing	None
H-1741	H-1741	Regeneration Gas Heater	2012	8.12 mmBtu/hr	Existing	None
H-1781	H-1781	Heat Medium Oil Heater	2012	26.0 mmBtu/hr	Existing	None
FL-991	FL-991	Process Flare	2012	68,600 scf/min	Existing	None
H-3741	H-3741	Regeneration Gas Heater	2013	7.69 mmBtu/hr	Existing	None
H-4741	H-4741	Regeneration Gas Heater	2014	7.69 mmBtu/hr	Existing	None
H-3781	H-3781	Heat Medium Oil Heater	2013	16.07 mmBtu/hr	Existing	None
H-5741	H-5741	Regeneration Gas Heater	2015	7.69 mmBtu/hr	Existing	None
H-5781	H-5781	Heat Medium Oil Heater	2015	50.78 mmbtuh/hr	Modification	None

TK-087	TK-087	520 gal Methanol Tank	2012	520 gal	New	None
TK-2609	TK-2609	520 gal Methanol Tank	2012	520 gal	New	None
TK-3410	TK-3410	520 gal Methanol Tank	2012	520 gal	New	None
TK-3829	TK-3829	520 gal Methanol Tank	2012	520 gal	New	None
TK-4220	TK-4220	520 gal Methanol Tank	2012	520 gal	New	None
TK-4410	TK-4410	520 gal Methanol Tank	2012	520 gal	New	None
TK-1824	TK-1824	4,265 gal Closed Drain Tank	2012	4,265 gal	New	None
TK-4824	TK-4824	4,533 gal Closed Drain Tank	2012	4,533 gal	New	None
FUG-004	FUG-004	Fugitive Equipment Leaks	Proposed	N/A	Modification	None
1B	1B	Compressor Blowdowns	2012	N/A	Modification	None
2B	2B	Facility Blowdowns	2012	N/A	Modification	None
RP	RP	Rod Packing Emissions	2012	N/A	Modification	None
CBB	CBB	Crankcase Blowby Emissions	2012	N/A	Modification	None

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT J: EMISSION POINTS DATA SUMMARY SHEET

Attachment J

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
H-5781	Upward Vertical Stack	H-5781	H-5781	N/A	None	N/A	N/A	NOx	3.30	14.46	3.30	14.46	Gas/Vapor	AP-42	--
								CO	2.03	8.90	2.03	8.90			
								VOC	0.61	2.67	0.61	2.67			
								PM_{10}	0.41	1.78	0.41	1.78			
								HAP	0.09	0.41	0.09	0.41			
								SO_2	0.03	0.13	0.03	0.13			
FUG-004	FUG-004	N/A	None	N/A	None	N/A	N/A	VOC	5.61	24.57	15.91	69.69	Gas/Vapor	EPA 453/R-95-017	--
								HAP	0.09	0.40	0.26	1.15			
G-1	Upward Vertical Stack	G-1	G-1	N/A	None	N/A	N/A	NOx	0.41	0.10	0.41	0.10	Gas/Vapor	AP-42	--
								CO	0.43	0.11	0.43	0.11			
								VOC	0.41	0.10	0.41	0.10			
								PM_{10}	0.00	0.00	0.00	0.00			
								HAP	0.00	0.00	0.00	0.00			
								SO_2	0.11	0.03	0.11	0.03			

G-2	Upward Vertical Stack	G-2	G-2	N/A	None	N/A	N/A	NOx CO VOC PM_{10} HAP SO_2	0.33 0.50 0.17 0.01 0.01 0.00	0.08 0.12 0.04 0.00 0.00 0.00	0.33 0.50 0.17 0.01 0.01 0.00	0.08 0.12 0.04 0.00 0.00 0.00	Gas/Vapor	AP-42	--
1B	Upward Vertical Stack	1B	1B	N/A	None	N/A	N/A	VOC HAP	66.50 0.83	1.20 0.02	66.50 0.83	1.20 0.02	Gas/Vapor	Eng. Estimate	--
2B	Upward Vertical Stack	2B	2B	FL-991	Flare	N/A	N/A	VOC HAP	89.23 1.12	390.9 4.92	1.79 0.02	7.82 0.10	Gas/Vapor	Eng. Estimate	--
RP	RP	N/A	None	N/A	None	N/A	N/A	VOC HAP	0.09 0.00	0.40 0.01	0.09 0.00	0.40 0.01	Gas/Vapor	40 CFR Part 98	--
CBB	CBB	N/A	None	N/A	None	N/A	N/A	NOx CO VOC PM_{10} HAP SO_2	0.44 0.26 0.24 0.07 0.08 0.00	1.95 1.13 1.03 0.29 0.37 0.01	0.44 0.26 0.24 0.07 0.08 0.00	1.95 1.13 1.03 0.29 0.37 0.01	Gas/Vapor	Manufacturer Information	--

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), **etc.** **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data

Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
H-5781	~3.0	730	32,237	76	1235	20	4378315.20	538098.82
FUG-004	N/A	Ambient	N/A	N/A	1235	NA	4378315.20	538098.82
G-1	~1.0	550	1,000	1	1235	5	4378315.20	538098.82
G-2	~1.0	550	1,000	1	1235	5	4378315.20	538098.82
1B	N/A	Ambient	N/A	N/A	1235	NA	4378315.20	538098.82
2B	N/A	Ambient	N/A	N/A	1235	NA	4378315.20	538098.82
RP	N/A	Ambient	N/A	N/A	1235	NA	4378315.20	538098.82
CBB	N/A	Ambient	N/A	N/A	1235	NA	4378315.20	538098.82

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

ATTACHMENT K: FUGITIVE EMISSIONS POINTS DATA SUMMARY SHEET

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☐ Yes ☒ No ☐ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☒ No ☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☐ Yes ☒ No ☐ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☒ Yes ☐ No ☒ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads						
Unpaved Haul Roads						
Storage Pile Emissions						
Loading/Unloading Operations						
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	VOC HAP	15.9109 0.2614	69.6897 1.1451	5.6097 0.0917	24.5705 0.4017	O (EPA 453/R-95-017)
General Clean-up VOC Emissions						
Other						

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L: EMISSION UNIT DATA SHEETS

EUDS –Process Heaters –H-5781

EUDS –Fugitive Emissions

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): H-5781

1. Name or type and model of proposed affected source:

   Heatec Process Heater, 50.78 MMBtu/hr

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   Natural gas, 50.78 MMBtu/hr

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   Natural gas, 50.78 MMBtu/hr

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   Combustion of natural gas

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Natural gas, 395.78 mmscf/yr

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Sulfur and ash are insignificant.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

Unknown @ °F and psia.

(d) Percent excess air: Unknown

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

Maxon Kinedizer LE burner, 50.78 mmBtu/hr

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

N/A

(g) Proposed maximum design heat input: 41 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ ~730 °F and 14.7 psia

a.	NO_X	3.30	lb/hr	grains/ACF
b.	SO_2	0.03	lb/hr	grains/ACF
c.	CO	2.03	lb/hr	grains/ACF
d.	PM_{10}	0.41	lb/hr	grains/ACF
e.	Hydrocarbons	N/A	lb/hr	grains/ACF
f.	VOCs	0.61	lb/hr	grains/ACF
g.	Pb	N/A	lb/hr	grains/ACF
h.	Specify other(s)			
	HAP	0.09	lb/hr	grains/ACF
	CO2(e)	6,541.19	lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	Record Operating hours
REPORTING	**TESTING**
As Required	N/A

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Attachment L
EMISSIONS UNIT DATA SHEET
CHEMICAL PROCESS

For chemical processes please fill out this sheet and all supplementary forms (see below) that apply. Please check all supplementary forms that have been completed.

- ☐ *Emergency Vent Summary Sheet*
- ☒ *Leak Sources Data Sheet*
- ☐ *Toxicology Data Sheet*
- ☐ *Reactor Data Sheet*
- ☐ *Distillation Column Data Sheet*

1. Chemical process area name and equipment ID number (as shown in *Equipment List Form*)
Components in natural gas and light liquid service

2. Standard Industrial Classification Codes (SICs) for process(es)
1321

3. List raw materials and ☒ attach MSDSs
Natural gas and natural gas liquids

4. List Products and Maximum Production and ☐ attach MSDSs

Description and CAS Number	Maximum Hourly (lb/hr)	Maximum Annual (ton/year)

5. Complete the *Emergency Vent Summary Sheet* for all emergency relief devices.

6. Complete the *Leak Source Data Sheet* and describe below or attach to application the leak detection or maintenance program to minimize fugitive emissions. Include detection instruments, calibration gases or methods, planned inspection frequency, and record-keeping, and similar pertinent information. If subject to a rule requirement (e.g. 40CFR60, Subpart VV), please list those here.

The purpose of the LDAR program is to detect and reduce/eliminate fugitive leaks from facility components (e.g., valves, pump seals, connectors, flanges, open-ended lines, and others), consistent with the provisions of 40 CFR Part 60, Subpart OOOO, and Method 21. Instruments meeting the specifications in Method 21 will be used to detect leaks, on a monitoring frequency consistent with the regulatory provisions stated above.

7. Clearly describe below or attach to application Accident Procedures to be followed in the event of an accidental spill or release.

In the event of an accidental spill or release, personnel will be protected, emergency response personnel will be notified and immediate steps to stop the spill or release will be implemented. More details are contained in the Emergency Response manual

8A. Complete the *Toxicology Data Sheet* or attach to application a toxicology report (an up-to-date material safety data sheets (MSDS) may be used) outlining the currently known acute and chronic health effects of each compound or chemical entity emitted to the air. If these compounds have already been listed in Item 3, then a duplicate MSDS sheet is not required. Include data such as the OSHA time weighted average (TWA) or mutagenicity, teratogenicity, irritation, and other known or suspected effects should be addressed. Indicate where these are unknown, and provide references.

8B. Describe any health effects testing or epidemiological studies on these compounds that are being or may be conducted by the company or required under TSCA, RCRA or other federal regulations. Discuss the persistence in the environment of any emission (e.g. pesticides, etc.).

9. **Waste Products** - Waste products status: (If source is subject to RCRA or 45CSR25, please contact the Hazardous Waste Section of WVDEP, OAQ at (304) 926-3647.)

9A. Types and amounts of wastes to be disposed:

9B. Method of disposal and location of waste disposal facilities:

Carrier: Phone:

9C. Check here if approved USEPA/State Hazardous Waste Landfill will be used ☐

10. Maximum and Projected Typical Operating Schedule for process or project as a whole (circle appropriate circle units:

	(hrs/day) (hr/batch)	(days), (batches/day), (batches/week)	(days/yr), (weeks/year)
10A. Maximum			
10B. Typical			

11. Complete a *Reactor Data Sheet* for each reactor in this chemical process.

12. Complete a *Distillation Column Data Sheet* for each distillation column in this chemical process.

13. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
As specified in Method 21 and 40 CFR Part 60 Subpart OOOO	**Same**
REPORTING	TESTING
Same	**Same**

MONITORING. Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation or air pollution control

RECORDKEEPING. Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING. Please describe the proposed frequency of reporting of the recordkeeping.

TESTING. Please describe any proposed emissions testing for this process equipment or air pollution control device.

14. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	light liquid VOC[6,7]	46	40 CFR Subpart OOOO Method 21	15	977.40
	heavy liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC	5,840	40 CFR Subpart OOOO Method 21	15	6,900.82
	Light Liquid VOC	1,631	40 CFR Subpart OOOO Method 21	15	2,127.91
	Non-VOC				
Open-ended Lines[12]	VOC				
	Non-VOC				
Sampling Connections[13]	VOC				
	Non-VOC				
Flanges	VOC	4,912	40 CFR Subpart OOOO Method 21	15	11,543.13
	Light Liquid	1,039	40 CFR Subpart OOOO Method 21	15	1,449.79
	Non-VOC				
Connectors	Gas VOC	12,735	40 CFR Subpart OOOO Method 21	15	14,047.70
	Light liquid VOC	4,784	40 CFR Subpart OOOO Method 21	15	11,385.81
Other	VOC	65	40 CFR Subpart OOOO Method 21	15	665.00
	Light Liquid	2	40 CFR Subpart OOOO Method 21	15	43.48

[1 - 13] See notes on the following page.

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% w/w VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.

2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in ppm. Do not include monitoring by visual or soap-bubble leak detection methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows:

   Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)

   If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category "valves, gas service:" 0/50/0/75/0/50 (bimonthly).

3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.

4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); O - other method, such as in-house emission factor (specify).

5. Do not include in the equipment count sealless pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)

6. Volatile organic compounds (VOC) means the term as defined in 40 CFR □51.100 (s).

7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a light liquid.

8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a heavy liquid.

9. LIST CO, H_2S, mineral acids, NO, NO_2, SO_3, etc. DO NOT LIST CO_2, H_2, H_2O, N_2, O_2, and Noble Gases.

10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.

11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.

12 Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.

13. Do not include closed-purge sampling connections.

ATTACHMENT N: SUPPORTING EMISSIONS CALCULATIONS

EXAMPLE CALCULATIONS

g/hp-hr Emission Factors:

Emission Factor (g/hp-hr) * Engine Rating (hp) * 1 lb/453.6 g = lb/hr

lb/mmBtu Emission Factors:

Emission Factor (lb/mmBtu) * Engine Rating (hp) * Fuel Use (Btu/hp-hr) * 1 mmBtu/1000000 Btu = lb/hr

lb/mmscf Emission Factors:

Emission Factor (lb/mmscf) * Heater Rating (mmBtu/hr) * 1/Fuel Heating Value (Btu/scf) = lb/hr

Tons per Year (TPY) Conversion:

lb/hr * Hours/Year * 1 ton/2000 lb = TPY

MarkWest Liberty Midstream & Resources L.L.C.
Mobley Gas Plant - Phase V

Summary of Potential Emissions

Criteria Pollutant Potential Emissions

Process/Facility	Potential Emissions (lb/hr)					
	NOx	CO	VOC	SO_2	PM[1]	HAPs
Waukesha P939OGSI Compressor Engines (5) (Existing)	4.35	5.7	2.6	0.05	1.5	1.05
CAT 3616 Compressor Engines (2) (Existing)	10.44	2.88	5.26	0.04	0.7	1.76
Regeneration Heater H-741 (8.12 MMBtu/hr) (Existing)	0.43	0.33	0.04	0.00	0.05	0.01
Hot Medium Oil Heater H-781 (26.0 MMBtu/hr) (Existing)	2.31	1.94	0.13	0.01	0.18	0.04
Regeneration Heater H-1741 (6.84 MMBtu/hr) (Existing)	0.36	0.28	0.03	0.00	0.05	0.01
Hot Medium Oil Heater H-1781 (18.05 MMBtu/hr) (Existing)	1.61	1.35	0.09	0.01	0.12	0.03
Regeneration Heaters H-3741 and H-4741 (7.69 MMBtu/hr) (Existir	0.82	0.63	0.08	0.01	0.11	0.03
Hot Medium Oil Heater H-3781 (16.07 MMBtu/hr) (Existing)	1.58	1.32	0.09	0.01	0.12	0.03
Regeneration Heaters H-5741 (7.69 MMBtu/hr) (New)	0.41	0.32	0.04	0.00	0.06	0.01
Regeneration Heater H-5781 (50.78 MMBtu/hr) (New)	3.30	2.03	0.61	0.03	0.41	0.09
Blowdowns	--	--	--	--	--	--
Process Flare (Existing)	0.11	0.09	0.01	0.01	0.01	0.08
Fugitives (Modified)	--	--	5.61	--	--	0.09
Rod Packing Emissions	--	--	0.09	--	--	0.00
Crankcase Emissions	0.44	0.26	0.24	0.00	0.07	0.08
Emergency Generator - G-1	0.41	0.43	0.41	0.11	0.00	0.00
Emergency Generator - G-2	0.33	0.50	0.17	0.00	0.01	0.01
Future Site-Wide Emissions (lb/hr)	**26.89**	**18.06**	**15.49**	**0.30**	**3.38**	**3.35**

[1] $PM = PM_{10} = PM_{2.5}$

Process/Facility	Potential Emissions (tpy)					
	NOx	CO	VOC	SO_2	PM[1]	HAPs
Waukesha P939OGSI Compressor Engines (5) (Existing)	19.15	24.95	11.45	0.2	6.55	4.6
CAT 3616 Compressor Engines (2) (Existing)	45.72	12.58	23.04	0.18	3.1	7.68
Regeneration Heater H-741 (8.12 MMBtu/hr) (Existing)	1.88	1.46	0.04	0.00	0.05	0.01
Hot Medium Oil Heater H-781 (26.0 MMBtu/hr) (Existing)	10.13	8.51	0.56	0.06	0.77	0.19
Regeneration Heater H-1741 (6.84 MMBtu/hr) (Existing)	1.59	1.23	0.15	0.02	0.20	0.05
Hot Medium Oil Heater H-1781 (18.05 MMBtu/hr) (Existing)	7.03	5.91	0.39	0.04	0.53	0.13
Regeneration Heaters H-3741 and H-4741 (7.69 MMBtu/hr) (Existir	3.57	2.76	0.36	0.04	0.50	0.12
Hot Medium Oil Heater H-3781 (16.07 MMBtu/hr) (Existing)	6.90	5.80	0.38	0.04	0.52	0.13
Regeneration Heaters H-5741 (7.69 MMBtu/hr) (New)	1.79	1.38	0.18	0.02	0.25	0.06
Regeneration Heater H-5781 (50.78 MMBtu/hr) (New)	14.46	8.90	2.67	0.13	1.78	0.41
Blowdowns	--	--	9.01	--	--	0.11
Process Flare (Existing)	0.48	0.39	0.04	0.04	0.04	0.35
Fugitives (Modified)	--	--	24.57	--	--	0.40
Rod Packing Emissions	--	--	0.40	--	--	0.01
Crankcase Emissions	1.95	1.13	1.03	0.01	0.29	0.37
Emergency Generator - G-1	0.10	0.11	0.10	0.03	0.00	0.00
Emergency Generator - G-2	0.08	0.12	0.04	0.00	0.00	0.00
Future Site-Wide Emissions (lb/hr)	**114.83**	**75.22**	**74.42**	**0.82**	**14.61**	**14.64**

[1] $PM = PM_{10} = PM_{2.5}$

Hazardous Air Pollutant Potential Emissions

Process/Facility	HAPs - Potential Emissions (lb/hr)								
	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Methanol	n-Hexane	Toluene	Xylenes
Waukesha P939OGSI Compressor Engines (5) (Existing)	2.00E-01	2.00E-01	1.00E-01	5.00E-02	2.00E-01	2.50E-01	--	5.00E-02	5.00E-02
CAT 3616 Compressor Engines (2) (Existing)	6.00E-01	3.60E-01	1.00E-02	2.00E-02	5.40E-01	1.80E-01	--	2.00E-02	2.00E-02
Regeneration Heater H-741 (8.12 MMBtu/hr) (Existing)	--	--	1.52E-05	--	5.42E-04	--	1.30E-02	2.46E-05	--
Hot Medium Oil Heater H-781 (26.0 MMBtu/hr) (Existing)	--	--	4.86E-05	--	1.73E-03	--	4.16E-02	7.86E-05	--
Regeneration Heater H-1741 (6.84 MMBtu/hr) (Existing)	--	--	1.28E-05	--	4.56E-04	--	1.10E-02	2.07E-05	--
Hot Medium Oil Heater H-1781 (18.05 MMBtu/hr) (Existing)	--	--	3.37E-05	--	1.20E-03	--	2.89E-02	5.46E-05	--
Regeneration Heaters H-3741 and H-4741 (7.69 MMBtu/hr) (Existir	--	--	3.17E-05	--	1.13E-03	--	2.71E-02	5.13E-05	--
Hot Medium Oil Heater H-3781 (16.07 MMBtu/hr) (Existing)	--	--	3.31E-05	--	1.18E-03	--	2.84E-02	5.36E-05	--
Regeneration Heaters H-5741 (7.69 MMBtu/hr) (New)	--	--	1.58E-05	--	5.65E-04	--	1.36E-02	2.56E-05	--
Regeneration Heater H-5781 (50.78 MMBtu/hr) (New)	--	--	1.05E-04	--	3.73E-03	--	8.96E-02	1.69E-04	--
Blowdowns	--	--	--	--	--	--	--	--	--
Process Flare (Existing)	--	--	--	--	--	--	--	--	--
Fugitives (Modified)	--	--	--	--	--	--	--	--	--
Rod Packing Emissions	--	--	2.42E-05	0.00E+00	--	--	1.07E-03	2.85E-05	3.29E-05
Crankcase Emissions	2.40E-02	1.68E-02	3.30E-03	2.10E-03	2.22E-02	1.29E-02	--	2.10E-03	2.10E-03
Emergency Generator - G-1	3.16E-04	3.81E-05	3.85E-04	--	4.86E-04	--	--	1.69E-04	1.17E-04
Emergency Generator - G-2	4.98E-03	3.06E-03	2.62E-04	2.36E-05	1.52E-03	1.49E-03	--	2.43E-04	1.10E-04
Future Site-Wide Emissions (lb/hr)	**0.83**	**0.58**	**0.11**	**0.07**	**0.77**	**0.44**	**0.25**	**0.07**	**0.07**

Process/Facility	HAPs - Potential Emissions (tpy)								
	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Methanol	n-Hexane	Toluene	Xylenes
Waukesha P939OGSI Compressor Engines (5) (Existing)	9.50E-01	9.00E-01	5.50E-01	5.00E-02	9.50E-01	1.05E+00	--	2.00E-01	5.00E-02
CAT 3616 Compressor Engines (2) (Existing)	2.60E+00	1.60E+00	1.40E-01	2.00E-02	2.38E+00	7.80E-01	--	1.20E-01	6.00E-02
Regeneration Heater H-741 (8.12 MMBtu/hr) (Existing)	--	--	6.64E-05	--	2.37E-03	--	5.70E-02	1.08E-04	--
Hot Medium Oil Heater H-781 (26.0 MMBtu/hr) (Existing)	--	--	2.13E-04	--	7.60E-03	--	1.82E-01	3.44E-04	--
Regeneration Heater H-1741 (6.84 MMBtu/hr) (Existing)	--	--	5.60E-05	--	2.00E-03	--	4.80E-02	9.06E-05	--
Hot Medium Oil Heater H-1781 (18.05 MMBtu/hr) (Existing)	--	--	1.48E-04	--	5.28E-03	--	1.27E-01	2.39E-04	--
Regeneration Heaters H-3741 and H-4741 (7.69 MMBtu/hr) (Existir	--	--	1.39E-04	--	4.95E-03	--	1.19E-01	2.25E-04	--
Hot Medium Oil Heater H-3781 (16.07 MMBtu/hr) (Existing)	--	--	1.45E-04	--	5.18E-03	--	1.24E-01	2.35E-04	--
Regeneration Heaters H-5741 (7.69 MMBtu/hr) (New)	--	--	6.93E-05	--	2.48E-03	--	5.94E-02	1.12E-04	--
Regeneration Heater H-5781 (50.78 MMBtu/hr) (New)	--	--	4.58E-04	--	1.64E-02	--	3.93E-01	7.41E-04	--
Blowdowns	--	--	--	--	--	--	--	--	--
Process Flare (Existing)	--	--	--	--	--	--	--	--	--
Fugitives (Modified)	--	--	--	--	--	--	--	--	--
Rod Packing Emissions	--	--	1.06E-04	0.00E+00	--	--	4.68E-03	1.25E-04	1.44E-04
Crankcase Emissions	1.07E-01	7.50E-02	2.07E-02	2.10E-03	9.99E-02	5.49E-02	--	9.60E-03	3.30E-03
Emergency Generator - G-1	7.90E-05	9.53E-06	9.61E-05	--	1.22E-04	--	--	4.21E-05	2.94E-05
Emergency Generator - G-2	1.24E-03	7.65E-04	6.55E-05	5.91E-06	3.80E-04	3.72E-04	--	6.08E-05	2.74E-05
Future Site-Wide Emissions (tpy)	**3.66**	**2.58**	**0.71**	**0.07**	**3.48**	**1.89**	**1.11**	**0.33**	**0.11**

Greenhouse Gas Potential Emissions

Process/Facility	GHG
	$CO_{2(t}e)$ (tpy)
Waukesha P939OGSI Compressor Engines (5) (Existing)	43487.4
CAT 3616 Compressor Engines (2) (Existing)	39569.86
Regeneration Heater H-741 (8.12 MMBtu/hr) (Existing)	4577.03
Hot Medium Oil Heater H-781 (26.0 MMBtu/hr) (Existing)	14824.60
Regeneration Heater H-1741 (6.84 MMBtu/hr) (Existing)	3855.52
Hot Medium Oil Heater H-1781 (18.05 MMBtu/hr) (Existing)	10174.30
Regeneration Heaters H-3741 and H-4741 (7.69 MMBtu/hr) (Existin	9553.98
Hot Medium Oil Heater H-3781 (16.07 MMBtu/hr) (Existing)	9982.61
Regeneration Heaters H-5741 (7.69 MMBtu/hr) (New)	4338.56
Regeneration Heater H-5781 (50.78 MMBtu/hr) (New)	28650.40
Process Flare (Existing)	828.75
Fugitives (Modified)	529.25
Rod Packing Emissions	36.87
Crankcase Emissions	2491.72
Emergency Generator - G-1	16.86
Emergency Generator - G-2	6.84
Future Site-Wide Emissions (lb/hr)	**172924.54**

MarkWest Liberty Midstream & Resources L.L.C.
Mobley Gas Plant - Difference Between Phase IV and Phase V

Summary of Potential Emissions

Criteria Pollutant Potential Emissions

Process/Facility	Potential Emissions (lb/hr)					
	NOx	CO	VOC	SO_2	PM[1]	HAPs
Previous Permit	24.77	16.90	10.27	0.18	3.38	3.42
Current Permit Application	26.89	18.06	15.49	0.30	3.38	3.35
Difference in Site-Wide Emissions (lb/hr)	**2.12**	**1.16**	**5.22**	**0.12**	**0.00**	**-0.07**

[1] PM = PM_{10} = $PM_{2.5}$

Process/Facility	Potential Emissions (tpy)					
	NOx	CO	VOC	SO_2	PM[1]	HAPs
Previous Permit	108.60	73.98	46.14	0.75	14.65	15.01
Current Permit Application	114.83	75.22	74.42	0.82	14.61	14.64
Difference in Site-Wide Emissions (lb/hr)	**6.23**	**1.24**	**28.28**	**0.07**	**-0.04**	**-0.37**

[1] PM = PM_{10} = $PM_{2.5}$

Hazardous Air Pollutant Potential Emissions

Process/Facility	HAPs - Potential Emissions (lb/hr)								
	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Methanol	n-Hexane	Toluene	Xylenes
Previous Permit	0.84	0.60	0.13	0.08	0.79	0.48	0.15	0.08	0.08
Current Permit Application	0.83	0.58	0.11	0.07	0.77	0.44	0.25	0.07	0.07
Difference in Site-Wide Emissions (lb/hr)	**-0.01**	**-0.02**	**-0.02**	**-0.01**	**-0.02**	**-0.04**	**0.10**	**-0.01**	**-0.01**

Process/Facility	HAPs - Potential Emissions (tpy)								
	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Methanol	n-Hexane	Toluene	Xylenes
Previous Permit	3.74	2.68	0.80	0.08	3.55	2.04	0.66	0.36	0.12
Current Permit Application	3.66	2.58	0.71	0.07	3.48	1.89	1.11	0.33	0.00
Difference in Site-Wide Emissions (lb/hr)	**-0.08**	**-0.10**	**-0.09**	**-0.01**	**-0.07**	**-0.15**	**0.45**	**-0.03**	**-0.12**

Greenhouse Gas Potential Emissions

Process/Facility	GHG
	$CO_2(e)$ (tpy)
Previous Permit	163244.57
Current Permit Application	172924.54
Difference in Site-Wide Emissions (lb/hr)	**9679.97**

MarkWest Liberty Midstream & Resources L.L.C.
Mobley Gas Plant

HMO Heater
(H-5781)

Source Designation:	
Manufacturer:	Heatec
Year Installed	TBD
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,124
Heat Input (MMBtu/hr)	50.78
Fuel Consumption (mmscf/hr):	4.52E-02
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf)[a,b]	Potential Emissions (lb/hr)[c]	Potential Emissions (tons/yr)[d]
NO_x	73.1	3.30	14.46
CO	45.0	2.03	8.90
SO_2	0.7	0.03	0.13
PM Total	9.0	0.41	1.78
PM Condensable	6.3	0.28	1.24
PM_{10} (Filterable)	2.1	0.09	0.41
$PM_{2.5}$ (Filterable)	2.1	0.09	0.41
VOC	13.5	0.61	2.67
CO_2	58.4 kg/mmbtu	6541.05	28649.80
CH_4	0.001 kg/mmbtu	0.12	0.54
N_2O	0.0001 kg/mmbtu	0.01	0.05
$CO_2(e)$	-	6547.47	28677.90

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions	
		(lb/hr)[c]	(tons/yr)[d]
HAPs:			
3-Methylchloranthrene	1.98E-06	8.96E-08	3.93E-07
7,12-Dimethylbenz(a)anthracene	1.76E-05	7.97E-07	3.49E-06
Acenaphthene	1.98E-06	8.96E-08	3.93E-07
Acenaphthylene	1.98E-06	8.96E-08	3.93E-07
Anthracene	2.64E-06	1.19E-07	5.23E-07
Benz(a)anthracene	1.98E-06	8.96E-08	3.93E-07
Benzene	2.31E-03	1.05E-04	4.58E-04
Benzo(a)pyrene	1.32E-06	5.97E-08	2.62E-07
Benzo(b)fluoranthene	1.98E-06	8.96E-08	3.93E-07
Benzo(g,h,i)perylene	1.32E-06	5.97E-08	2.62E-07
Benzo(k)fluoranthene	1.98E-06	8.96E-08	3.93E-07
Chrysene	1.98E-06	8.96E-08	3.93E-07
Dibenzo(a,h) anthracene	1.32E-06	5.97E-08	2.62E-07
Dichlorobenzene	1.32E-03	5.97E-05	2.62E-04
Fluoranthene	3.31E-06	1.49E-07	6.54E-07
Fluorene	3.09E-06	1.39E-07	6.11E-07
Formaldehyde	8.26E-02	3.73E-03	1.64E-02
Hexane	1.98E+00	8.96E-02	3.93E-01
Indo(1,2,3-cd)pyrene	1.98E-06	8.96E-08	3.93E-07
Phenanthrene	1.87E-05	8.46E-07	3.71E-06
Pyrene	5.51E-06	2.49E-07	1.09E-06
Toluene	3.75E-03	1.69E-04	7.41E-04
Arsenic	2.20E-04	9.96E-06	4.36E-05
Beryllium	1.32E-05	5.97E-07	2.62E-06
Cadmium	1.21E-03	5.48E-05	2.40E-04
Chromium	1.54E-03	6.97E-05	3.05E-04
Cobalt	9.26E-05	4.18E-06	1.83E-05
Lead	5.51E-04	2.49E-05	1.09E-04
Manganese	4.19E-04	1.89E-05	8.29E-05
Mercury	2.87E-04	1.29E-05	5.67E-05
Nickel	2.31E-03	1.05E-04	4.58E-04
Selenium	2.64E-05	1.19E-06	5.23E-06
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.64E-05	1.19E-06	5.23E-06
Naphthalene	6.72E-04	3.04E-05	1.33E-04
Total HAP		**9.40E-02**	**4.12E-01**

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 (07/98) for all criteria and HAP pollutants, corrected to site-specific gas heat content.

[b] Emission factors for GHG pollutants from 40 CFR Part 98, Subpart C and corrected to site-specific gas heat content.

[c] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[d] Annual Emissions $(\text{tons/yr})_{\text{Potential}} = (\text{lb/hr})_{\text{Emissions}} \times$ (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream and Resources, L.L.C.
Mobley Gas Plant

Emergency Generator Engine Emissions (Per Engine)
(G-1)

Source Designation:	
Manufacturer:	Generac
Model No.:	MMG45
Stroke Cycle:	4-stroke
Type of Burn:	Diesel
Year Installed	
Fuel Used:	Diesel
Fuel High Heating Value (HHV) (Btu/gal):	137,380
Rated Horsepower (bhp):	53
Specific Fuel Consumption (gal/hr)	3.0
Maximum Fuel Consumption at 100% Load (gal/hr):	3.0
Heat Input (MMBtu/hr)	0.41
Stack Designation:	

Operational Details:

Potential Annual Hours of Operation (hr/yr):	500
Potential Fuel Consumption (gal/yr):	1,500

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors[a]	Units
NOx	3.50	g/bhp-hr
CO (uncontrolled)	3.70	g/bhp-hr
CO (controlled)	3.70	g/bhp-hr
SO_2	2.05E-03	g/bhp-hr
PM_{10} (Filterable)	2.20E-02	g/bhp-hr
$PM_{2.5}$ (Filterable)	2.20E-02	g/bhp-hr
PM Condensable	2.20E-02	g/bhp-hr
PM Total	2.20E-02	g/bhp-hr
VOC (uncontrolled)	3.50	g/bhp-hr
VOC (controlled)	3.50	g/bhp-hr

MarkWest Liberty Midstream and Resources, L.L.C.
Mobley Gas Plant

Emergency Generator Engine Emissions (Per Engine)
(G-1)

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Potential Emissions (lb/hr)[b]	(tons/yr)[c]
NO_x	0.41	0.10
CO (uncontrolled)	0.43	0.11
CO (controlled)	0.43	0.11
SO_2	0.11	0.03
PM_{10} (Filterable)	0.00	0.00
$PM_{2.5}$ (Filterable)	0.00	0.00
PM Condensable	0.00	0.00
PM Total	0.00	0.00
VOC (uncontrolled)	0.41	0.10
VOC (controlled)	0.41	0.10

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[b]	(tons/yr)[c]
HAPs:			
Acetaldehyde	7.67E-04	0.0003	0.0001
Acrolein	9.25E-05	0.0000	0.0000
Benzene	9.33E-04	0.0004	0.0001
1,3-Butadiene	3.91E-05	0.0000	0.0000
Formaldehyde	1.18E-03	0.0005	0.0001
Toluene	4.09E-04	0.0002	0.0000
Xylene	2.85E-04	0.0001	0.0000
Polycyclic Organic Matter:			
Naphthalene	8.48E-05	0.0000	0.0000
Total HAP		**0.00**	**0.00**

[a] HAP emission factors from AP-42 Section 3.2, Table 3.3-2 "Speciated Organic Compound Emission Factors for Uncontrolled Diesel Engines," Supplement F, October 1996. Criteria pollutant factors are based on EPA Tier IV standards.

[b] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

[c] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream & Resources L.L.C.
Mobley Gas Plant

Emergency Generator Engine Emissions (Per Engine)
(G-2)

Source Designation:	
Manufacturer:	Kohler
Model No.:	40ERES
Stroke Cycle:	4-stroke
Type of Burn:	Lean
Year Installed	2011
Fuel Used:	Natural Gas
Fuel High Heating Value (HHV) (Btu/ft^3):	1,020
Rated Horsepower (bhp):	75
Specific Fuel Consumption (ft^3/hr)	584
Maximum Fuel Consumption at 100% Load (ft3/hr):	584
Heat Input (MMBtu/hr)	0.60
Stack Designation:	

Operational Details:

Potential Annual Hours of Operation (hr/yr):	500
Potential Fuel Consumption (ft^3/yr):	292,000

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	**Emission Factors[a]**	**Units**
NOx	2.00	g/bhp-hr
CO (uncontrolled)	3.00	g/bhp-hr
CO (controlled)	3.00	g/bhp-hr
SO_2	5.88E-04	lb/MMBtu
PM_{10} (Filterable)	7.71E-05	lb/MMBtu
$PM_{2.5}$ (Filterable)	7.71E-05	lb/MMBtu
PM Condensable	9.91E-03	lb/MMBtu
PM Total	9.99E-03	lb/MMBtu
VOC (uncontrolled)	1.00	g/bhp-hr
VOC (controlled)	1.00	g/bhp-hr

MarkWest Liberty Midstream & Resources L.L.C.
Mobley Gas Plant

Emergency Generator Engine Emissions (Per Engine)
(G-2)

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Potential Emissions (lb/hr)[b]	(tons/yr)[c]
NO_x	0.33	0.08
CO (uncontrolled)	0.50	0.12
CO (controlled)	0.50	0.12
SO_2	0.000	0.00
PM_{10} (Filterable)	0.000	0.00
$PM_{2.5}$ (Filterable)	0.000	0.00
PM Condensable	0.006	0.00
PM Total	0.006	0.00
VOC (uncontrolled)	0.17	0.04
VOC (controlled)	0.17	0.04

Hazardous Air Pollutant (HAP) Potential Emissions

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[b]	(tons/yr)[c]
HAPs:			
1,1,2,2-Tetrachloroethane	4.00E-05	2.38E-05	5.96E-06
1,1,2-Trichloroethane	3.18E-05	1.89E-05	4.74E-06
1,3-Butadiene	2.67E-04	1.59E-04	3.98E-05
1,3-Dichloropropene	2.64E-05	1.57E-05	3.93E-06
Acetaldehyde	8.36E-03	4.98E-03	1.24E-03
Acrolein	5.14E-03	3.06E-03	7.65E-04
Benzene	4.40E-04	2.62E-04	6.55E-05
Carbon Tetrachloride	3.67E-05	2.19E-05	5.47E-06
Chlorobenzene	3.04E-05	1.81E-05	4.53E-06
Chloroform	2.85E-05	1.70E-05	4.24E-06
Ethylbenzene	3.97E-05	2.36E-05	5.91E-06
Ethylene Dibromide	4.43E-05	2.64E-05	6.60E-06
Formaldehyde	2.55E-03	1.52E-03	3.80E-04
Methanol	2.50E-03	1.49E-03	3.72E-04
Methylene Chloride	2.00E-05	1.19E-05	2.98E-06
Naphthalene	7.44E-05	4.43E-05	1.11E-05
PAH	2.69E-05	1.60E-05	4.01E-06
Styrene	2.36E-05	1.41E-05	3.51E-06
Toluene	4.08E-04	2.43E-04	6.08E-05
Vinyl Chloride	1.49E-05	8.88E-06	2.22E-06
Xylene	1.84E-04	1.10E-04	2.74E-05
Total HAP		**0.01**	**0.00**

[a] SO_2, PM, and HAP emission factors (excluding HCHO) from AP-42 Section 3.2, Table 3.2-2"Uncontrolled Emission Factors for 4-Stroke

[b] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

[c] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream & Resources L.L.C.
Mobley Gas Plant

Blowdowns

VOC and HAP Vented Blowdown Emissions

Blowdown Emissions Sources	Number of Units	Vented Gas Volume Per Blowdown Event (scf)	Number of Blowdown Events per year	Total Volume NG Emitted (scf/yr)	Flare Control Efficiency (%)	Potential VOC Emissions (tpy)	Potential HAP Emissions (tpy)	Potential CO_2 Emissions (tpy)	Potential CH_4 Emissions (tpy)	Potential $CO_2(e)$ Emissions (tpy)
Engines	2	2,200	36	158,400	0	0.59	0.007	0.017	2.561	53.804
Engines	5	920	36	165,600	0	0.61	0.008	0.017	2.678	56.250
Plant Blowdowns	1	289,840	365	105,791,600	98	7.82	0.098	0.221	34.213	718.692
Total Compressor Blowdown Emissions						**1.20**	**0.015**	**0.034**	**5.239**	**110.054**
Total Plant Blowdown Emissions						**7.82**	**0.098**	**0.221**	**34.213**	**718.692**
Total						**9.0**	**0.114**	**0.255**	**39.452**	**828.746**

Density of natural gas: 0.05 lb/ft^3 @ STP (www.engineeringtoolbox.com)

Fugitive Emissions

Component Type	No. of Components	Service[1]	AP-42 Leak Factor (kg/hr/component)	Reduction[2]	Post-Control Emission Factor (kg/hr/component)	VOC Wt %[3]	HAP Wt %[3]	Emissions				
								Total HC (lb/hr)	Total VOC (lb/hr)	Total VOC (tpy)	Total HAP (lb/hr)	Total HAP (tpy)
Flange	7	Vapor	3.90E-04	30%	2.73E-04	100.00%	1.26%	0.0042	0.0042	0.0185	0.0001	0.0002
Compression Total								**0.0042**	**0.0042**	**0.0185**	**0.0001**	**0.0002**
Compressor	8	Vapor	8.80E-03	85%	1.32E-03	100.00%	1.26%	0.0233	0.0233	0.1020	0.0003	0.0013
Flange	41	Light Liquid	1.10E-04	30%	7.70E-05	100.00%	2.42%	0.0070	0.0070	0.0305	0.0002	0.0007
Flange	113	Vapor	3.90E-04	30%	2.73E-04	55.00%	0.69%	0.0681	0.0374	0.1639	0.0005	0.0021
Flange	524	Vapor	3.90E-04	30%	2.73E-04	100.00%	1.26%	0.3156	0.3156	1.3822	0.0040	0.0174
Flange	235	Vapor	3.90E-04	30%	2.73E-04	15.00%	0.19%	0.1415	0.0212	0.0930	0.0003	0.0012
Flange	40	Vapor	3.90E-04	30%	2.73E-04	0.50%	0.01%	0.0241	0.0001	0.0005	0.0000	0.0000
Connector	2	Light Liquid	2.10E-04	30%	1.47E-04	55.00%	1.33%	0.0006	0.0004	0.0016	0.0000	0.0000
Connector	280	Light Liquid	2.10E-04	30%	1.47E-04	100.00%	2.42%	0.0908	0.0908	0.3977	0.0022	0.0096
Connector	142	Vapor	2.00E-04	30%	1.40E-04	0.50%	0.01%	0.0439	0.0002	0.0010	0.0000	0.0000
Connector	307	Vapor	2.00E-04	30%	1.40E-04	55.00%	0.69%	0.0948	0.0521	0.2284	0.0007	0.0029
Connector	868	Vapor	2.00E-04	30%	1.40E-04	15.00%	0.19%	0.2681	0.0402	0.1761	0.0005	0.0022
Connector	1422	Vapor	2.00E-04	30%	1.40E-04	100.00%	1.26%	0.4392	0.4392	1.9236	0.0055	0.0242
PRD	28	Vapor	8.80E-03	97%	2.64E-04	100.00%	1.26%	0.0163	0.0163	0.0714	0.0002	0.0009
PRD	3	Vapor	8.80E-03	97%	2.64E-04	55.00%	0.69%	0.0017	0.0010	0.0042	0.0000	0.0001
PRD	12	Vapor	8.80E-03	97%	2.64E-04	15.00%	0.19%	0.0070	0.0010	0.0046	0.0000	0.0001
Pump	6	Vapor	2.40E-03	85%	3.60E-04	100.00%	1.26%	0.0048	0.0048	0.0209	0.0001	0.0003
Valve	4	Light Liquid	2.50E-03	97%	7.50E-05	55.00%	1.33%	0.0007	0.0004	0.0016	0.0000	0.0000
Valve	97	Light Liquid	2.50E-03	97%	7.50E-05	100.00%	2.42%	0.0160	0.0160	0.0703	0.0004	0.0017
Valve	47	Vapor	4.50E-03	97%	1.35E-04	0.50%	0.01%	0.0140	0.0001	0.0003	0.0000	0.0000
Valve	411	Vapor	4.50E-03	97%	1.35E-04	15.00%	0.19%	0.1224	0.0184	0.0804	0.0002	0.0010
Valve	161	Vapor	4.50E-03	97%	1.35E-04	55.00%	0.69%	0.0479	0.0264	0.1155	0.0003	0.0015
Valve	641	Vapor	4.50E-03	97%	1.35E-04	100.00%	1.26%	0.1909	0.1909	0.8361	0.0024	0.0105
DeEthanizer Total								**1.9386**	**1.3027**	**5.7059**	**0.0177**	**0.0777**
Compressor	1	Light Liquid	7.50E-03	85%	1.13E-03	100.00%	2.42%	0.0025	0.0025	0.0109	0.0001	0.0003
Compressor	1	Vapor	8.80E-03	85%	1.32E-03	0.50%	0.01%	0.0029	0.0000	0.0001	0.0000	0.0000
Compressor	4	Vapor	8.80E-03	85%	1.32E-03	15.00%	0.19%	0.0116	0.0017	0.0077	0.0000	0.0001
Flange	98	Light Liquid	1.10E-04	30%	7.70E-05	100.00%	2.42%	0.0166	0.0166	0.0729	0.0004	0.0018
Flange	514	Vapor	3.90E-04	30%	2.73E-04	15.00%	0.19%	0.3096	0.0464	0.2034	0.0006	0.0026
Flange	122	Vapor	3.90E-04	30%	2.73E-04	0.50%	0.01%	0.0735	0.0004	0.0016	0.0000	0.0000
Connector	691	Light Liquid	2.10E-04	30%	1.47E-04	100.00%	2.42%	0.2241	0.2241	0.9815	0.0054	0.0238
Connector	661	Vapor	2.00E-04	30%	1.40E-04	15.00%	0.19%	0.2041	0.0306	0.1341	0.0004	0.0017
Connector	288	Vapor	2.00E-04	30%	1.40E-04	0.50%	0.01%	0.0889	0.0004	0.0019	0.0000	0.0000
PRD	4	Light Liquid	7.50E-03	97%	2.25E-04	100.00%	2.42%	0.0020	0.0020	0.0087	0.0000	0.0002
PRD	17	Vapor	8.80E-03	97%	2.64E-04	15.00%	0.19%	0.0099	0.0015	0.0065	0.0000	0.0001
PRD	4	Vapor	8.80E-03	97%	2.64E-04	0.50%	0.01%	0.0023	0.0000	0.0001	0.0000	0.0000
Valve	174	Light Liquid	2.50E-03	97%	7.50E-05	100.00%	2.42%	0.0288	0.0288	0.1261	0.0007	0.0031
Valve	230	Vapor	4.50E-03	97%	1.35E-04	15.00%	0.19%	0.0685	0.0103	0.0450	0.0001	0.0006
Valve	115	Vapor	4.50E-03	97%	1.35E-04	0.50%	0.01%	0.0342	0.0002	0.0008	0.0000	0.0000
Inlet Total								**1.0796**	**0.3656**	**1.6011**	**0.0078**	**0.0341**

Compressor	3	Vapor	8.80E-03	85%	1.32E-03	0.50%	0.01%	0.0087	0.0000	0.0002	0.0000	0.0000
Flange	203	Light Liquid	1.10E-04	30%	7.70E-05	100.00%	2.42%	0.0345	0.0345	0.1510	0.0008	0.0037
Flange	205	Vapor	3.90E-04	30%	2.73E-04	0.50%	0.01%	0.1235	0.0006	0.0027	0.0000	0.0000
Flange	210	Vapor	3.90E-04	30%	2.73E-04	15.00%	0.19%	0.1265	0.0190	0.0831	0.0002	0.0010
Flange	318	Vapor	3.90E-04	30%	2.73E-04	100.00%	1.26%	0.1915	0.1915	0.8388	0.0024	0.0106
Connector	1147	Light Liquid	2.10E-04	30%	1.47E-04	100.00%	2.42%	0.3720	0.3720	1.6291	0.0090	0.0394
Connector	355	Vapor	2.00E-04	30%	1.40E-04	15.00%	0.19%	0.1096	0.0164	0.0720	0.0002	0.0009
Connector	510	Vapor	2.00E-04	30%	1.40E-04	100.00%	1.26%	0.1575	0.1575	0.6899	0.0020	0.0087
Connector	657	Vapor	2.00E-04	30%	1.40E-04	0.50%	0.01%	0.2029	0.0010	0.0044	0.0000	0.0001
PRD	6	Light Liquid	7.50E-03	97%	2.25E-04	100.00%	2.42%	0.0030	0.0030	0.0130	0.0001	0.0003
PRD	8	Vapor	8.80E-03	97%	2.64E-04	0.50%	0.01%	0.0047	0.0000	0.0001	0.0000	0.0000
PRD	10	Vapor	8.80E-03	97%	2.64E-04	15.00%	0.19%	0.0058	0.0009	0.0038	0.0000	0.0000
PRD	16	Vapor	8.80E-03	97%	2.64E-04	100.00%	1.26%	0.0093	0.0093	0.0408	0.0001	0.0005
Pump	2	Vapor	2.40E-03	85%	3.60E-04	100.00%	1.26%	0.0016	0.0016	0.0070	0.0000	0.0001
Pump	4	Light Liquid	1.30E-02	85%	1.95E-03	100.00%	2.42%	0.0172	0.0172	0.0754	0.0004	0.0018
Valve	311	Light Liquid	2.50E-03	97%	7.50E-05	100.00%	2.42%	0.0515	0.0515	0.2254	0.0012	0.0055
Valve	199	Vapor	4.50E-03	97%	1.35E-04	0.50%	0.01%	0.0593	0.0003	0.0013	0.0000	0.0000
Valve	296	Vapor	4.50E-03	97%	1.35E-04	100.00%	1.26%	0.0882	0.0882	0.3861	0.0011	0.0049
Valve	234	Vapor	4.50E-03	97%	1.35E-04	15.00%	0.19%	0.0697	0.0105	0.0458	0.0001	0.0006
				Mobley 1 Total				**1.6368**	**0.9749**	**4.2700**	**0.0178**	**0.0781**
Compressor	1	Light Liquid	7.50E-03	85%	1.13E-03	100.00%	2.42%	0.0025	0.0025	0.0109	0.0001	0.0003
Compressor	3	Vapor	8.80E-03	85%	1.32E-03	100.00%	1.26%	0.0087	0.0087	0.0383	0.0001	0.0005
Flange	270	Vapor	3.90E-04	30%	2.73E-04	100.00%	1.26%	0.1626	0.1626	0.7122	0.0020	0.0090
Flange	589	Vapor	3.90E-04	30%	2.73E-04	15.00%	0.19%	0.3547	0.0532	0.2330	0.0007	0.0029
Flange	28	Vapor	3.90E-04	30%	2.73E-04	0.50%	0.01%	0.0169	0.0001	0.0004	0.0000	0.0000
Flange	268	Light Liquid	1.10E-04	30%	7.70E-05	100.00%	2.42%	0.0455	0.0455	0.1994	0.0011	0.0048
Connector	437	Vapor	2.00E-04	30%	1.40E-04	100.00%	1.26%	0.1350	0.1350	0.5911	0.0017	0.0074
Connector	1653	Vapor	2.00E-04	30%	1.40E-04	15.00%	0.19%	0.5105	0.0766	0.3354	0.0010	0.0042
Connector	42	Vapor	2.00E-04	30%	1.40E-04	0.50%	0.01%	0.0130	0.0001	0.0003	0.0000	0.0000
Connector	712	Light Liquid	2.10E-04	30%	1.47E-04	100.00%	2.42%	0.2309	0.2309	1.0113	0.0056	0.0245
Connector	2	Vapor	0.00E+00	30%	0.00E+00	15.00%	0.19%	0.0000	0.0000	0.0000	0.0000	0.0000
PRD		Light Liquid	7.50E-03	97%	2.25E-04	100.00%	2.42%	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	21	Vapor	8.80E-03	97%	2.64E-04	15.00%	0.19%	0.0122	0.0018	0.0080	0.0000	0.0001
PRD	13	Vapor	8.80E-03	97%	2.64E-04	100.00%	1.26%	0.0076	0.0076	0.0332	0.0001	0.0004
Pump	11	Light Liquid	1.30E-02	85%	1.95E-03	100.00%	2.42%	0.0473	0.0473	0.2073	0.0011	0.0050
Pump	2	Vapor	2.40E-03	85%	3.60E-04	15.00%	0.19%	0.0016	0.0002	0.0010	0.0000	0.0000
Valve	299	Light Liquid	2.50E-03	97%	7.50E-05	100.00%	2.42%	0.0495	0.0495	0.2167	0.0012	0.0052
Valve	251	Vapor	4.50E-03	97%	1.35E-04	100.00%	1.26%	0.0748	0.0748	0.3274	0.0009	0.0041
Valve	647	Vapor	4.50E-03	97%	1.35E-04	15.00%	0.19%	0.1927	0.0289	0.1266	0.0004	0.0016
Valve	50	Vapor	4.50E-03	97%	1.35E-04	0.50%	0.01%	0.0149	0.0001	0.0003	0.0000	0.0000
Valve	1	Vapor	0.00E+00	97%	0.00E+00	15.00%	0.19%	0.0000	0.0000	0.0000	0.0000	0.0000
				Mobley 2 Total				**1.8808**	**0.9253**	**4.0528**	**0.0160**	**0.0701**

Compressor	15	Vapor	8.80E-03	85%	1.32E-03	0.50%	0.01%	0.0437	0.0002	0.0010	0.0000	0.0000
Compressor	3	Vapor	8.80E-03	85%	1.32E-03	100.00%	1.26%	0.0087	0.0087	0.0383	0.0001	0.0005
Flange	37	Light Liquid	1.10E-04	30%	7.70E-05	0.50%	0.01%	0.0063	0.0000	0.0001	0.0000	0.0000
Flange	41	Light Liquid	1.10E-04	30%	7.70E-05	100.00%	2.42%	0.0070	0.0070	0.0305	0.0002	0.0007
Flange	429	Vapor	3.90E-04	30%	2.73E-04	0.50%	0.01%	0.2584	0.0013	0.0057	0.0000	0.0001
Flange	209	Vapor	3.90E-04	30%	2.73E-04	15.00%	0.19%	0.1259	0.0189	0.0827	0.0002	0.0010
Flange	244	Vapor	3.90E-04	30%	2.73E-04	100.00%	1.26%	0.1469	0.1469	0.6436	0.0019	0.0081
Connector	3	Heavy Liquid	7.50E-06	30%	5.25E-06	100.00%	2.42%	0.0000	0.0000	0.0002	0.0000	0.0000
Connector	309	Light Liquid	2.10E-04	30%	1.47E-04	0.50%	0.01%	0.1002	0.0005	0.0022	0.0000	0.0001
Connector	243	Light Liquid	2.10E-04	30%	1.47E-04	100.00%	2.42%	0.0788	0.0788	0.3451	0.0019	0.0084
Connector	1120	Vapor	2.00E-04	30%	1.40E-04	0.50%	0.01%	0.3459	0.0017	0.0076	0.0000	0.0001
Connector	820	Vapor	2.00E-04	30%	1.40E-04	100.00%	1.26%	0.2532	0.2532	1.1092	0.0032	0.0140
Connector	440	Vapor	2.00E-04	30%	1.40E-04	15.00%	0.19%	0.1359	0.0204	0.0893	0.0003	0.0011
PRD		Light Liquid	7.50E-03	97%	2.25E-04	100.00%	2.42%	0.0000	0.0000	0.0000	0.0000	0.0000
PRD	15	Vapor	8.80E-03	97%	2.64E-04	0.50%	0.01%	0.0087	0.0000	0.0002	0.0000	0.0000
PRD	9	Vapor	8.80E-03	97%	2.64E-04	100.00%	1.26%	0.0052	0.0052	0.0230	0.0001	0.0003
PRD	9	Vapor	8.80E-03	97%	2.64E-04	15.00%	0.19%	0.0052	0.0008	0.0034	0.0000	0.0000
Pump	6	Vapor	2.40E-03	85%	3.60E-04	0.50%	0.01%	0.0048	0.0000	0.0001	0.0000	0.0000
Pump	3	Light Liquid	1.30E-02	85%	1.95E-03	100.00%	2.42%	0.0129	0.0129	0.0565	0.0003	0.0014
Valve	79	Light Liquid	2.50E-03	97%	7.50E-05	0.50%	0.01%	0.0131	0.0001	0.0003	0.0000	0.0000
Valve	108	Light Liquid	2.50E-03	97%	7.50E-05	100.00%	2.42%	0.0179	0.0179	0.0783	0.0004	0.0019
Valve	413	Vapor	4.50E-03	97%	1.35E-04	0.50%	0.01%	0.1230	0.0006	0.0027	0.0000	0.0000
Valve	307	Vapor	4.50E-03	97%	1.35E-04	15.00%	0.19%	0.0914	0.0137	0.0601	0.0002	0.0008
Valve	328	Vapor	4.50E-03	97%	1.35E-04	100.00%	1.26%	0.0977	0.0977	0.4278	0.0012	0.0054
				Mobley 3 Total				**1.8908**	**0.6867**	**3.0078**	**0.0100**	**0.0438**
Compressor	15	Vapor	8.80E-03	85%	1.32E-03	0.50%	0.01%	0.0437	0.0002	0.0010	0.0000	0.0000
Compressor	2	Vapor	8.80E-03	85%	1.32E-03	15.00%	0.19%	0.0058	0.0009	0.0038	0.0000	0.0000
Compressor	11	Vapor	8.80E-03	85%	1.32E-03	100.00%	1.26%	0.0320	0.0320	0.1403	0.0004	0.0018
Flange	28	Light Liquid	1.10E-04	30%	7.70E-05	0.50%	0.01%	0.0048	0.0000	0.0001	0.0000	0.0000
Flange	323	Light Liquid	1.10E-04	30%	7.70E-05	100.00%	2.42%	0.0549	0.0549	0.2403	0.0013	0.0058
Flange	160	Vapor	3.90E-04	30%	2.73E-04	0.50%	0.01%	0.0964	0.0005	0.0021	0.0000	0.0000
Flange	236	Vapor	3.90E-04	30%	2.73E-04	15.00%	0.19%	0.1421	0.0213	0.0934	0.0003	0.0012
Flange	459	Vapor	3.90E-04	30%	2.73E-04	100.00%	1.26%	0.2764	0.2764	1.2108	0.0035	0.0152
Connector	467	Light Liquid	2.10E-04	30%	1.47E-04	0.50%	0.01%	0.1514	0.0008	0.0033	0.0000	0.0001
Connector	930	Light Liquid	2.10E-04	30%	1.47E-04	100.00%	2.42%	0.3016	0.3016	1.3209	0.0073	0.0320
Connector	1220	Vapor	2.00E-04	30%	1.40E-04	0.50%	0.01%	0.3768	0.0019	0.0083	0.0000	0.0001
Connector	671	Vapor	2.00E-04	30%	1.40E-04	15.00%	0.19%	0.2072	0.0311	0.1362	0.0004	0.0017
Connector	1120	Vapor	2.00E-04	30%	1.40E-04	100.00%	1.26%	0.3459	0.3459	1.5150	0.0044	0.0191
PRD	8	Light Liquid	7.50E-03	97%	2.25E-04	100.00%	2.42%	0.0040	0.0040	0.0174	0.0001	0.0004
PRD	8	Vapor	8.80E-03	97%	2.64E-04	15.00%	0.19%	0.0047	0.0007	0.0031	0.0000	0.0000
PRD	21	Vapor	8.80E-03	97%	2.64E-04	100.00%	1.26%	0.0122	0.0122	0.0536	0.0002	0.0007
PRD	14	Vapor	8.80E-03	97%	2.64E-04	0.50%	0.01%	0.0082	0.0000	0.0002	0.0000	0.0000
Pump	6	Light Liquid	1.30E-02	85%	1.95E-03	100.00%	2.42%	0.0258	0.0258	0.1130	0.0006	0.0027
Pump	3	Vapor	2.40E-03	85%	3.60E-04	0.50%	0.01%	0.0024	0.0000	0.0001	0.0000	0.0000
Pump	1	Vapor	2.40E-03	85%	3.60E-04	15.00%	0.19%	0.0008	0.0001	0.0005	0.0000	0.0000
Pump	2	Vapor	2.40E-03	85%	3.60E-04	100.00%	1.26%	0.0016	0.0016	0.0070	0.0000	0.0001
Valve	119	Light Liquid	2.50E-03	97%	7.50E-05	0.50%	0.01%	0.0197	0.0001	0.0004	0.0000	0.0000
Valve	422	Light Liquid	2.50E-03	97%	7.50E-05	100.00%	2.42%	0.0698	0.0698	0.3058	0.0017	0.0074
Valve	445	Vapor	4.50E-03	97%	1.35E-04	0.50%	0.01%	0.1325	0.0007	0.0029	0.0000	0.0000
Valve	344	Vapor	4.50E-03	97%	1.35E-04	15.00%	0.19%	0.1024	0.0154	0.0673	0.0002	0.0008
Valve	512	Vapor	4.50E-03	97%	1.35E-04	100.00%	1.26%	0.1525	0.1525	0.6679	0.0019	0.0084
				Mobley 4 Total				**2.5756**	**1.3503**	**5.9145**	**0.0223**	**0.0977**
				Plant Wide Emissions				**11.0064**	**5.6097**	**24.5705**	**0.0917**	**0.4017**

[1]All other components in Vapor Service are considered inlet gas including Skids 1-4 in Mobley 2.

[2]Based on Texas Commission on Environmental Quality (TCEQ) 28VHP Control Program and guidance titled "Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives". Connectors are monitored with an instrument and have claimed 75% reduction.

[3]For components in vapor service areas in close drain, pipeline pump/rack, product pump, refrigeration, stabilizer, process skids, flare, heat exchanger, tankage were considered 100% VOC. For components in vapor service listed as less than 10% VOC service and meter skid was considered residue gas. For liquid service everything considered 100% VOC service except the charge pump skid and deethanizer exchange skid on the deethanizer considered NGL. HAP percentages are conservatively estimated using the ratio of HAP to VOC in the inlet gas and the Majorsville Y Grade inlet.

MarkWest Liberty Midstream and Resources, L.L.C.
Mobley Gas Plant
Rod Packing Emissions

Emission Factor[a]	0.02	(scf CH_4/min)
Mole fraction Methane	0.81	
Total Emission Factor	0.02	(scf/min)
MW	20.01	(lbmole/hr)
Number of Compressors	7	
Total Emissions	0.50	(lb/hr)

[a]Based on 40 CFR Part 98 Subpart W Section 233 Emissions Factors

Pollutant	Mass %	Emissions	
		lb/hr	tpy
VOC	18.47%	0.09	0.40
Total HAPs	0.23%	0.00	0.01
Benzene	0.00%	0.00	0.00
Toluene	0.01%	0.00	0.00
Ethylbenzene	0.00%	0.00	0.00
Xylenes	0.01%	0.00	0.00
n-Hexane	0.22%	0.00	0.00
Methane	80.85%	0.40	1.76

MarkWest Liberty Midstream and Resources, L.L.C.
Mobley Gas Plant
Crankcase Emissions

Crankcase Blowby Percentage[1] 3%

Pollutant	Total Engine Emissions		Blowby Percentage	Blowby Emissions	
	lb/hr	tpy		lb/hr	tpy
NO_X	14.79	64.87	3%	0.44	1.95
CO	8.58	37.53		0.26	1.13
VOC	7.86	34.49		0.24	1.03
SO_2	0.09	0.38		0.00	0.01
PM	2.20	9.65		0.07	0.29
Benzene	0.11	0.69		0.00	0.02
Toluene	0.07	0.32		0.00	0.01
Ethylbenzene	0.07	0.07		0.00	0.00
Xylenes	0.07	0.11		0.00	0.00
n-Hexane	0.00	0.00		0.00	0.00
Formaldehyde	0.74	3.33		0.02	0.10
Total HAPs	2.81	12.28		0.08	0.37

ATTACHMENT P: PUBLIC NOTICE

MarkWest Liberty Midstream & Resources L.L.C. has published a public notice in *The Wetzel Chronicle* newspaper, headquartered in Wetzel County, WV. This paper serves the geographical area surrounding the proposed facility.

The affidavit issued by the paper showing the date of publication and the actual text is attached following the proposed text:

AIR QUALITY PERMIT NOTICE

Notice of Application

Notice is given that MarkWest Liberty Midstream & Resources L.L.C. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, to modify a New Source Review (45 CSR 13) construction permit for a modification to a natural gas processing plant (Mobley Gas Plant) located at 14,624 North Fork Road, Smithfield, West Virginia 26437 (Permit R13-2878D). The site is located at Latitude N 39° 33' 08" and Longitude W 80° 32' 26". The latitude and longitude coordinates in decimal degrees are 39.5522° N and 80.54056° W.

The modification will result in changes to the potential to emit of the following Regulated Air Pollutants as follows:

Nitrogen Oxides (NOx)	6.23 tons/yr
Carbon Monoxide (CO)	1.24 tons/yr
Volatile Organic Compounds (VOC)	28.28 tons/yr
Particulate Matter (PM)	-0.04 tons/yr
Sulfur Dioxide (SO_2)	0.07 tons/yr
Total HAPs	-0.37 tons/yr

Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice. Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated the 27th of February 2017

By: MarkWest Liberty Midstream & Resources L.L.C.
Leanne Meyer
VP of EH&S
1515 Arapahoe Street
Tower 1, Suite 1600
Denver, CO 80202-2137

APPLICATION FEE

Per 45CSR13 and 45CSR22, Title 45, Series 22, Section 3.4.a, a fee of $1,000 must be submitted for a Modification Permit. In addition, per Section 3.4b, a Category Fee of $1,000 must be paid for NSPS requirements.

MarkWest Liberty Midstream & Resources L.L.C. hereby submits a check for the total $2,000.00 payable to: WVDEP/DAQ

APPENDIX A: SUPPORT DOCUMENTS

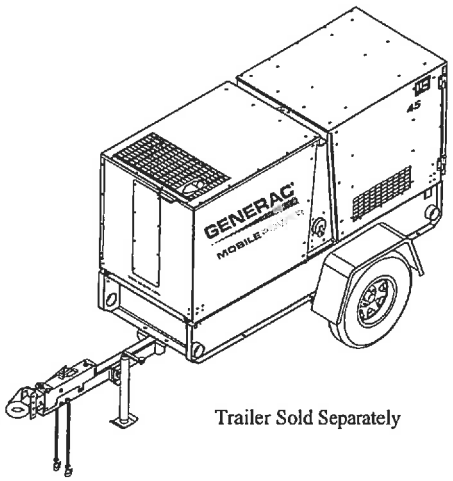
Generator Specification Sheets

Heater Specification Sheets

Mobile Generator – MMG45FHK Specifications

ENGINE

- Kubota® V3600-T-E3BG - turbocharged, diesel engine
  - Prime - 53 hp @ 1800 rpm
  - Standby - 58 hp @ 1800 rpm
  - 4 cylinder
  - 3.6 L displacement
  - Interim Tier IV approved
- Steel, single wall fuel tank
  - 106 gal. capacity
  - 31 hr. run time – full load
  - Fuel tank built into skid of generator set
- Fuel consumption at prime:
  - 100% - 3.0 gph (11.4 Lph)
  - 75% - 2.3 gph (8.7 Lph)
  - 50% - 1.5 gph (5.7 Lph)
- Cooling system capable of operating at 120°F ambient
- Low coolant shutdown
- Radiator and oil drains plumbed to exterior
- Rubber vibration dampers isolate engine/generator from frame
- Disposable air filter - paper element
- Air filter restriction indicator mounted on control panel
- 60 Hz engine/generator
- Electronic isochronous governing



Trailer Sold Separately

GENERATOR

- Marathon Electric®
  - Brushless
  - 4 pole
  - Class H insulation
- Voltage regulation +/- 1% with Marathon SE350 Voltage Regulator

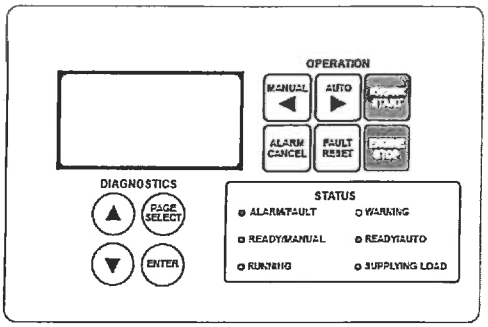
SYSTEM OUTPUT

- 3 position selector switch
  - Single phase – 120 / 240V Zig Zag
  - Three phase – 120 / 208V Low Wye
  - Three phase – 277 / 480V High Wye
- 33 kW / 33 kVA – standby, single phase
- 30 kW / 30 kVA – prime, single phase
- 35 kW / 44 kVA – standby, three phase
- 33 kW / 41 kVA – prime, three phase

SYSTEM CONTROLS

- Microprocessor-based controller
  - Backlit, 128x64 pixel resolution display
  - -40°F to 185°F operating temperature range
  - Thermostatically controlled LCD heater

  - Six LED indicators w/ lamp test
    - Alarm / Fault (Red)
    - Ready / Manual (Red)
    - Running (Green)
    - Warning (Yellow)
    - Ready / Auto (Green)
    - Supplying Load (Green)



- Push buttons for easy operation
  - Manual or Auto Start
  - Engine Start or Stop
  - Alarm Cancel & Fault Reset
  - Scrolling Arrows for Diagnostic Information
    - System kW output display
    - Line output & frequency display
    - Engine diagnostic display
      - Oil pressure
      - Engine temperature
      - Fuel level
      - Battery
    - System hours
      - Running hours
      - kW hours
      - Time to service
  - Alarm list – warnings / shutdowns are date & time stamped
    - Fuel level: warning – 15%; shutdown – 5%
    - Overspeed protection: shutdown – 115%
    - Oil pressure: warning – 25 psi; shutdown – 20 psi
    - Coolant temperature: warning – 220°F; shutdown – 230°F
    - Battery voltage: over – 15VDC; under – 11VDC
    - Generator over voltage: warning – 110%; shutdown – 111%
    - Generator under voltage: warning – 87%; shutdown – 86%
    - Generator over frequency: warning – 105%; shutdown – 110%
    - Generator under frequency: warning – 95%; shutdown – 90%
    - Over current shutdown

ELECTRICAL CONTROLS

- Remote start / stop contacts located next to lug box
- Lockable control box door with diagnostics window
- Lockable lug box with safety switch
  - Trips main breaker when lug door is opened
  - Disables voltage regulator
- Cable entry guides to the lug box
  - Restricts access of foreign objects
- Output ground connection lug inside lug box
- 200A main breaker with shunt trip
- Convenience receptacles with individual breakers (restricted use in high wye mode)
  - (2) 120V 20 Amp GFCI duplex outlets (Nema 5-20R type)
  - (2) 125 / 250V 50 Amp, 3 pole, 4 wire twistlock (Non-Nema 6369)

- Panel mounted rheostat for voltage adjustment - +/- 10%

- 720 CCA wet cell battery

ENCLOSURE

- Generac Mobile Power decals
- "Flip-Hood" Patented design - aluminum, sound attenuated enclosure
  - Easy access for daily maintenance
  - Centralized location for all electrical connections/wiring
  - UV & fade resistant, high temperature cured, white polyester powder paint
  - Insulated and baffled
  - 68 dB(A) at 23 feet – prime power
- Fully lockable enclosure including doors and fuel fill
- Stainless steel hinges on doors
- Emergency stop switch located on outside of enclosure
- Central lifting point
- Multi-lingual operating/safety decals
- Document holder with operating manual including AC/DC wiring diagrams

TRAILER

- "Flip-Tongue" design
- DOT approved tail, side, brake, and directional lights
  - Recessed rear lights
- Transportation tie downs
- Safety chains with spring loaded safety hooks
- 2" ball hitch
- 5000 lb. axle with surge brakes
- 3000 lb. tongue jack with footplate
- P205/75R15 tubeless tires – 8 ply

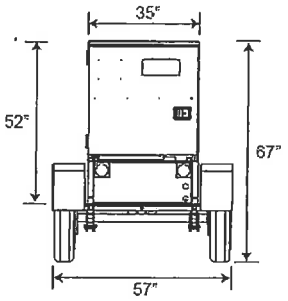
WEIGHTS & DIMENSIONS

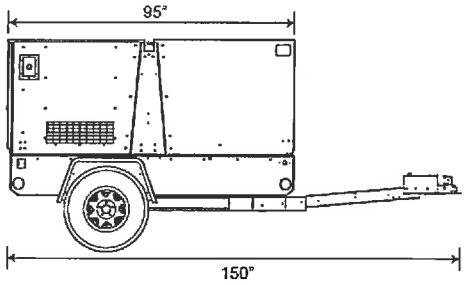
Skid mounted

- Dry weight: 2329 lbs (1056 kg)
- Operating weight: 3082 lbs (1398 kg)
- 95 x 35 x 52 in
  (2.41 x 0.89 x 1.32 m)

Trailer mounted

- Dry weight: 2853 lbs
  (1294 kg)
- Operating weight: 3606 lbs
  (1636 kg)
- 150 x 57 x 67 in
  (3.81 x 1.45 x 1.70 m)





WARRANTY

- Engine and generator covered under OEM warranty – consult factory for details.

CERTIFICATIONS

- CSA certified

MMG45FHK Options

ENGINE OPTIONS

- In-line engine block heater (Kim Hotstart)
- Fuel transfer pump

ELECTRICAL CONTROLS OPTIONS

- 720 CCA gel cell battery
- Battery disconnect
- Battery charger – 2A trickle

GENERATOR OPTIONS

- PMG Generator - critical grade power quality
- Super Start Generator - motor starting applications

VOLTAGE OUTPUT OPTIONS

- 4 position phase switch
  - Single phase – 120 / 240V High Wye
  - Three phase – 120 / 208V Low Wye
  - Three phase – 277 / 480V Zig Zag
  - Three phase – 120 / 240V Delta
- Dedicated voltage configurations
- Buck Transformer kit – Provides 120V at GFCI outlets when in 277/480V
- Cam locks

SYSTEM CONTROLS OPTIONS

- Analog gauges
- Auxiliary strobe/audible indication for soft & hard alarm conditions

COOLANT OPTIONS

- 60/40 Coolant - cold weather applications

ENCLOSURE OPTIONS

- Fire extinguisher
- Interior cabinet light
- Control panel light

FUEL TANK OPTIONS

- 36 hr. single wall fuel tank (requires tandem axle trailer)
- 29 hr. double wall fuel tank
- 120% Containment

TRAILER OPTIONS

- Single axle trailer w/ electric brakes
- Tandem axle trailer w/ surge brakes
- Tandem axle trailer w/ electric brakes
- 6 pin or 7 spade electrical connectors
- Spare tire/wheel kit

HITCH OPTIONS

- 3" lunette ring
- 2 5/16" ball
- Adjustable height options:
  - 2" ball
  - 2 5/16" ball

Model: 40ERES

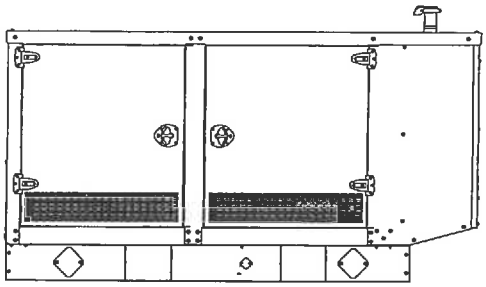
KOHLER POWER SYSTEMS

190–480 V Gas

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Ratings Range

		60 Hz	50 Hz
Standby:	kW	33–40	24–34
	kVA	33–50	26–40



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- UL 2200 listing is available. (60 Hz only)
- The generator set accepts rated load in one step.
- The 60 Hz generator set engine is certified by the Environmental Protection Agency (EPA) to conform to the New Source Performance Standard (NSPS) for stationary spark-ignited emissions.
- A one-year limited warranty covers all systems and components. Two- and five-year extended warranties are also available.
- Alternator features:
  - The unique Fast-Response™ II excitation system delivers excellent voltage response and short-circuit capability using a permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Controllers are available for all applications. See controller features inside.
  - The electronic, isochronous governor incorporates an integrated drive-by-wire throttle body actuator delivering precise frequency regulation.
- Quick-ship (QS) models with selected features and a five-year basic warranty are available. See your Kohler distributor for details.

Generator Set Ratings

				Natural Gas 130°C Rise Standby Rating		LP Gas 130°C Rise Standby Rating	
Alternator	Voltage	Ph	Hz	kW/kVA	Amps	kW/kVA	Amps
	120/208	3	60	39/49	135	39/49	135
	127/220	3	60	39/49	128	40/50	131
	120/240	3	60	39/49	117	39/49	117
	120/240	1	60	33/33	138	33/33	138
	139/240	3	60	39/49	117	40/50	120
	220/380	3	60	35/44	66	35/44	66
	277/480	3	60	39/49	58	40/50	60
4P5	110/190	3	50	31/39	119	32/40	122
	115/200	3	50	28/35	101	28/35	101
	120/208	3	50	24/30	83	24/30	83
	110/220	1	50	26/26	118	26/26	118
	110/220	3	50	31/39	102	32/40	105
	220/380	3	50	31/39	59	32/40	61
	230/400	3	50	28/35	51	28/35	51
	240/416	3	50	24/30	42	24/30	42
4Q5	120/240	1	60	38/38	158	38/38	158
	110/220	1	50	30/30	136	32/32	145
4Q7	120/240	1	60	40/40	167	40/40	167
	110/220	1	50	32/32	145	34/34	155

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. *Standby Ratings:* Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory. Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. GENERAL GUIDELINES FOR DERATING: *Altitude:* Derate 1.3% per 100 m (328 ft.) elevation above 200 m (656 ft.). *Temperature:* Derate 3.0% per 10°C (18°F) temperature above 25°C (77°F). For dual fuel engines, use the natural gas ratings for both the primary and secondary fuels.

Alternator Specifications

Specifications	Alternator
Manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet
Leads: quantity, type	
4P5	12, Reconnectable
4Q5, 4Q7	4, 110-120/220-240
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H
Temperature rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	
Decision-Maker 3000 controller	3-Phase Sensing, ±0.5%
Decision-Maker 550 controller (with 0.5% drift due to temp variation)	3-Phase Sensing, ±0.25%
Unbalanced load capability	100% of Rated Standby Current
One-step load acceptance	100% of Rating
Peak motor starting kVA:	(35% dip for voltages below)
480 V, 380 V 4P5 (12 lead)	140 (60 Hz), 98 (50 Hz)
240 V, 220 V 4Q5 (4 lead)	95 (60 Hz), 78 (50 Hz)
240 V, 220V 4Q7 (4 lead)	104 (60 Hz), 91 (50 Hz)

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Vacuum-impregnated windings with fungus-resistant epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
- Fast-Response™ II brushless alternator with brushless exciter for excellent load response.

Application Data

Engine

Engine Specifications	60 Hz	50 Hz
Manufacturer	General Motors	
Engine: model, type	Industrial Powertrain Vortec 4.3 L, 4-Cycle Natural Aspiration	
Cylinder arrangement	V-6	
Displacement, L (cu. in.)	4.3 (262)	
Bore and stroke, mm (in.)	101.6 x 88.4 (4.00 x 3.48)	
Compression ratio	9.05:1	
Piston speed, m/min. (ft./min.)	318 (1044)	265 (870)
Main bearings: quantity, type	4, Babbitt	
Rated rpm	1800	1500
Max. power at rated rpm, kW (HP)	56 (75)	44.8 (60)
Engine power at standby rating, kW (HP)		
Natural Gas	41.9 (56)	40.3 (54)
LP Gas	45.3 (61)	42.5 (57)
Cylinder head material	Cast Iron	
Piston type and material	High Silicon Aluminum	
Crankshaft material	Nodular Iron	
Valve (exhaust) material	Forged Steel	
Governor type	Electronic	
Frequency regulation, no-load to full-load	Isochronous	
Frequency regulation, steady state	±0.5%	
Frequency	Fixed	
Air cleaner type, all models	Dry	

Exhaust

Exhaust System	60 Hz	50 Hz
Exhaust manifold type	Dry	
Exhaust flow at rated kW, m^3/min. (cfm)	8.8 (310)	7.4 (260)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	649 (1200)	
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3.0)	
Exhaust outlet size at engine hookup, mm (in.)	76 (3.0) OD	

Engine Electrical

Engine Electrical System	60 Hz	50 Hz
Ignition system	Electronic, Distributor	
Battery charging alternator:		
Ground (negative/positive)	Negative	
Volts (DC)	12	
Ampere rating	70	
Starter motor rated voltage (DC)	12	
Battery, recommended cold cranking amps (CCA):		
Qty., rating for -18°C (0°F)	One, 630	
Battery voltage (DC)	12	

Fuel

Fuel System	60 Hz	50 Hz
Fuel type	LP Gas, Natural Gas, or Dual Fuel	
Fuel supply line inlet	1 NPTF	
Natural gas fuel supply pressure, kPa (in. H_2O)	1.74-2.74 (7-11)	
LPG vapor withdrawal fuel supply pressure, kPa (in. H_2O)	1.24-2.74 (5-11)	
Dual fuel engine, LPG vapor withdrawal fuel supply pressure, kPa (in. H_2O)	1.24 (5)	

Fuel Composition Limits *	Nat. Gas	LP Gas
Methane, % by volume	90 min.	—
Ethane, % by volume	4.0 max.	—
Propane, % by volume	1.0 max.	85 min.
Propene, % by volume	0.1 max.	5.0 max.
C_4 and higher, % by volume	0.3 max.	2.5 max.
Sulfur, ppm mass	25 max.	
Lower heating value, MJ/m^3 (Btu/ft^3), min.	33.2 (890)	84.2 (2260)

* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

Application Data

Lubrication

Lubricating System	60 Hz	50Hz
Type	Full Pressure	
Oil pan capacity, L (qt.)	4.3 (4.5)	
Oil pan capacity with filter, L (qt.)	5.7 (6.0)	
Oil filter: quantity, type	1, Cartridge	

Cooling

Radiator System	60 Hz	50 Hz
Ambient temperature, °C (°F)	45 (113)	
Engine jacket water capacity, L (gal.)	6.8 (1.8)	
Radiator system capacity, including engine, L (gal.)	19.7 (5.2)	
Engine jacket water flow, Lpm (gpm)	106.0 (28)	87.1 (23)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	39.2 (2230)	34.6 (1970)
Water pump type	Centrifugal	
Fan diameter, including blades, mm (in.)	533 (21)	
Fan, kWm (HP)	1.5 (2.0)	1.0 (1.2)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)	

Operation Requirements

Air Requirements	60 Hz	50 Hz
Radiator-cooled cooling air, m^3/min. (scfm)†	142 (5000)	113 (4000)
Combustion air, m^3/min. (cfm)	2.61 (92)	2.20 (78)
Heat rejected to ambient air:		
Engine, kW (Btu/min.)	16.0 (910)	15.4 (860)
Alternator, kW (Btu/min.)	6.3 (360)	6.2 (350)

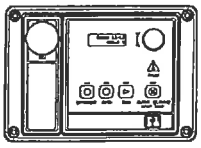
† Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

Fuel Consumption‡	Standby Rating	
Natural Gas, m^3/hr. (cfh) at % load	60 Hz	50 Hz
100%	16.5 (584)	13.5 (477)
75%	13.8 (486)	10.4 (367)
50%	10.2 (360)	8.0 (281)
25%	7.7 (272)	5.8 (206)
LP Gas, m^3/hr. (cfh) at % load	**60 Hz**	**50 Hz**
100%	6.9 (242)	5.4 (190)
75%	5.4 (191)	4.2 (148)
50%	4.0 (141)	3.1 (111)
25%	2.9 (101)	2.3 (81)

‡ Nominal Fuel Rating: Natural gas, 37 MJ/m^3 (1000 Btu/ft^3)
LP Vapor, 93 MJ/m^3 (2500 Btu/ft^3)

LP vapor conversion factors:
8.58 $ft.^3$ = 1 lb.
0.535 m^3 = 1 kg.
36.39 $ft.^3$ = 1 gal.

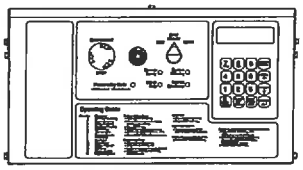
Controllers



Decision-Maker® 3000 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication through a PC via network or serial configuration
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection

Refer to G6-100 for additional controller features and accessories.

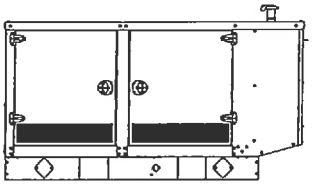


Decision-Maker® 550 Controller
Provides advanced control, system monitoring, and system diagnostics with remote monitoring capabilities.

- Digital display and keypad provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication through a PC via network or modem configuration
- Controller supports Modbus® protocol
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection

Refer to G6-46 for additional controller features and accessories.

Sound Enclosure



- Sound level at 7 m (23 ft.) with full load: 69 dB(A)
- Sound attenuating enclosure uses acoustic insulation that meets UL 94 HF1 flammability classification and repels moisture absorption.
- Vertical air inlet and outlet discharge with 90 degree bends to redirect air and reduce noise.
- Internal-mounted critical silencer and flexible exhaust connector.
- Skid-mounted, steel (standard) or aluminum (optional) construction with hinged doors.
- Fade-, scratch-, and corrosion-resistant Kohler® Cashmere Power Armor™ textured e-coat paint.
- Lockable, flush-mounted door latches.
- Certified to withstand 241 kph (150 mph) wind load rating (aluminum enclosures only).

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KohlerPower.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Additional Standard Features

- Alternator Protection
- Battery Rack and Cables
- Electronic, Isochronous Governor
- Gas Fuel System (includes fuel mixer, electronic secondary gas regulator, gas solenoid valve, and flexible fuel line between the engine and the skid-mounted fuel system components)
- Integral Vibration Isolation
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature
- Steel Sound Enclosure

Available Options

Approvals and Listings

- ☐ CSA Approval
- ☐ UL 2200 Listing (60 Hz only)

Enclosure

- ☐ Aluminum Sound Enclosure

Fuel System

- ☐ Dual Fuel NG/LPG (automatic changeover)
- ☐ Flexible Fuel Line (required when the generator set skid is spring mounted)
- ☐ Gas Filter
- ☐ Additional Gas Solenoid Valve

Controller

- ☐ Common Fault Relay
- ☐ Communication Products and PC Software (550 controller only)
- ☐ Customer Connection (550 controller only)
- ☐ Dry Contact (isolated alarm) (550 controller only)
- ☐ Input/Output Module (3000 controller only)
- ☐ Remote Annunciator Panel
- ☐ Remote Audiovisual Alarm Panel (550 controller only)
- ☐ Remote Emergency Stop
- ☐ Run Relay

Cooling System

- ☐ Block Heater, 1500 W, 110-120 V
- ☐ Block Heater, 1500 W, 190-240 V [recommended for ambient temperatures below 10°C (50°F)]

Electrical System

- ☐ Alternator Strip Heater
- ☐ Battery
- ☐ Battery Charger, Equalize/Float Type
- ☐ Battery Heater
- ☐ Line Circuit Breaker (NEMA1 enclosure)
- ☐ Line Circuit Breaker with Shunt Trip (NEMA1 enclosure)

Miscellaneous

- ☐ Air Cleaner Restrictor Indicator
- ☐ Engine Fluids (oil and coolant) Added
- ☐ Rated Power Factor Testing
- ☐ Rodent Guards

Literature

- ☐ General Maintenance
- ☐ Overhaul
- ☐ Production

Warranty

- ☐ 2-Year Basic
- ☐ 5-Year Basic
- ☐ 5-Year Comprehensive

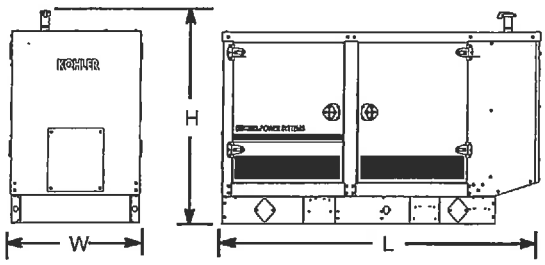
Other Options

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Dimensions and Weights

Overall Size, L x W x H, mm (in.):	2585 x 1078 x 1509 (102 x 42.4 x 59.4)
Weight, wet, kg (lb.):	
With steel sound enclosure	982 (2165)
With aluminum sound enclosure	890 (1962)

Weight includes generator set with engine fluids and largest alternator option, sound enclosure, and silencer.



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

THOMAS RUSSELL CO.

Tulsa, Oklahoma

JOB NO:	TRJ-362D	DATE:	4/30/2014
CLIENT:	Markwest Energy	BY:	TWO
SUBJECT:	Deethanizer for SC20		

FIRED HEATER

Service:	HMO Heater				Tag No:	H-782	
Design Duty, MBTU/Hr	41,743				Type:	Helical Coil	
No. of Coils per Unit		No. Units:	One		Heatec Model: HCI-25010-40(Q)-G		

Fluid		Therminol 55		Burners		
		Inlet	Outlet		Gas	Oil
Liquids	Lbs/Hr	553,147	553,147	LHV (BTU/scf)	894	
Density	Lbs/CuFt	50.9	47.60	Mol. Wt.	16.5	
Molecular Weight		320	320	Gravity	0.57	
Specific Heat	BTU/Lb °F	0.527	0.591	Pressure Avail. (psig)	85	
Thermal Cond.	BTU/Hr-Ft-°F	0.0686	0.0635	Pressure Req'd (psig)		
Viscosity	cP	2.6400	0.919	Steam for Atomizing	NA	
Vapor	Lbs/Hr	0	0	Fuel Gas Req'd (MSCFD)	1,404.18	N/A
Density	Lbs/CuFt			Mfgr:	Maxon Low NOx ⚠	
Molecular Weight				Type:	Forced Draft, 100 HP Blower ⚠	
Specific Heat	BTU/Lb °F			Number Req'd	One (est)	
Thermal Cond.	BTU/HrFt °F			Pilots Req'd (Note 4)	Yes, electrical ignition	
Viscosity	cP			Ultra Low NOx Req'd	<40 ppmvd	
Operating Temp.	°F	220	355	**Structural Design**		
Operating Pressure	PSIA	135		Wind Load, MPH, (3)	120 MPH	
Velocity	Ft/Sec		9 Calc.	Seismic Zone, (3)	S_S=100%, S_1=40%	
Pressure Drop	PSI	30 Allow.	17 Calc.	Ambient, °F	-20 / 105	
Fouling Resistance	SqFt*F/BTU	0.0020		Elevation, Ft	1300	
Design Press. / Temp.		150 PSIG	600 °F	**Stack Design**		
Min. Design Mtl. Temp.		-20 °F @	150 PSIG	Self-supporting	Yes	
Corrosion Allowance		0.0625		Minimum Height	8 ft above top of heater	
Insulation Thickness		3-5" high temp ceramic fiber		Minimum Wall Thickness:	0.125	
Efficiency-Based on LHV	(%)	82.2% (Assume 3% Loss)		Lining Type	No	
Excess Air		15		Lining Thickness:	No	
Firebox Unit Heat Release		16,511 BTU/Hr- Ft^3		Damper:	No	
Number of Passes		Process - Four, Fireside - Two (Note 8) ⚠				

Coil Design		Radiant	Convection-Bare	Convection-Finned	
Fluid Temperature	In/Out	220 / 355			
Number Tubes		Four (Note 8) ⚠			
Tube O.D.	In	4" Sch. 40	10" 300# ANSI RF Flg	Inlet and Outlet ⚠	
Tube Length	Eff. Ft	-----			
Bare Surface	Sq Ft	3,648			
Finned Surface	Sq Ft	N/A			
Avg. Heat Flux	BTU/Hr-Sq Ft	13,841			
Tube Materials		SA-106 Gr. B			

Convection Fins (inch):	Height:	Thickness:	No. / inch:	Material:	
Overall Dimension:	50.4' L x 11.9' W x 12.7' H (Less Stack)			Dry Weight:	78,152 lbs.
Code Requirements:	ASME VIII Div I		Stamp: Yes	Nat'l Board:	Yes

Notes:

1) Add 10% to duty and flow rates for design.
2) See attached Scope of Supply.
3) Wind design per ASCE 7-10, Cat. III, Exposure C. Seismic design per ASCE 7-10, I=1.25, Site D.
4) Electrical power to be 480 V / 3 ph / 60 hz. Control enclosures to be NEMA 4.
5) Add Spare ignitor
6) Flanges to be 300# RFWN
7) High degree of turndown is requested 10: 1 burner design is requested.
⚠ 8) Flow orifice meter and transmitter required for each coil, routed to Heatec panel. Signal will be taken to UOPR control panel.

REVISION	A		B		0		⚠ 1	
ENGINEER/DATE	TWO	4/30/14	JSR	7/14/14	JRG	7/28/14	TKF	2/12/15
ISSUED FOR	RFQ		Revision		Purchase		Revised	